WORKING PAPER

Bank Capital and the Cost of Equity[1]

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EMNES Working Paper Nº 44 / October, 2020

Abstract

Using a sample of publicly listed banks from 62 developed and developing, including MENA, countries over the 1991-2017 period, we investigate the impact of capital on banks' cost of equity. We report the highest median cost of equity in Lebanon with 25.1%. Consistent with the theoretical prediction that more equity in the capital mix leads to a fall in firms' costs of equity, we find that better capitalised banks enjoy lower equity costs. Our baseline estimations indicate that a 1 percentage point increase in a bank's equity-to-assets ratio lowers its cost of equity by about 18 basis points. Our results also suggest that the form of capital that investors value the most is sheer equity capital; other forms of capital, such as Tier 2 regulatory capital, are less (or not at all) valued by investors. Additionally, our main finding that capital has a negative effect on banks' cost of equity holds in both developed and developing countries. The results of this paper provide the missing evidence in the debate on the effects of higher capital requirements on banks' funding costs.

JEL Classification: G21, G28

Keywords: Cost of equity, Bank capital, Banking regulation, Financial stability

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1 We would like to thank Thorsten Beck, Ehsan Ebrahimy, Connel Fullenkamp, Philip Molyneux, Anjan Thakor, Thierry Tressel and the Economics seminar participants at the American University of Sharjah for useful comments. Anis Samet gratefully acknowledges the financial support of the Office of Research and Graduate Studies at the American University of Sharjah. Any errors and omissions are, however, the authors' sole responsibility. The views expressed in this paper are those of the author(s) and do not necessarily represent the views of the IMF, its Executive Board, or IMF management.

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Introduction

The global financial crisis (GFC) provided compelling evidence that capital is a bank's strongest defence against losses from adverse movements in asset values. During the crisis, banks operating with low capital levels were brought to the brink of insolvency as the crisis unfolded and losses accumulated. Many such banks were acquired by healthier ones, whilst others only escaped extinction through government bailouts using public funds.[7] Policymakers and regulators immediately reacted by stepping up capital requirements, with the aim of strengthening the resilience to shocks of individual banks, as well as the whole banking system. Efforts to enhance bank capitalisation had culminated in the adoption of the Basel III regulatory framework in 2010, which requires banks to hold higher capital ratios, compared to those recommended by its predecessor, Basel II.[8]

Yet, eight years after adopting the new, more stringent, capital regulatory framework, bank capital continues to be the subject of a heated debate between numerous banking stakeholders; namely, bankers, regulators, politicians, and academics. In particular, the consequences of increased capital requirements for banks' funding costs continue to be controversial amongst bankers on the one hand and regulators and academics on the other. Whilst the latter praise the merits of higher capital ratios, on the grounds that they enhance banks' loss-absorption capacities and spare society the heavy costs of bank failures, bankers argue that requiring banks to operate with more equity capital increases funding costs because "equity has a higher cost than debt." To persuade policymakers and society at large, bankers assert that higher funding costs would be passed on to borrowers, which would eventually result in less credit and depress the real economy. For instance, in November 2016, *The Economist* reported that European banks were complaining that higher capital requirements "will crimp lending and growth—although research by the BIS suggests that better-capitalized

[7] Examples of banks bailed out by their competitors include J.P. Morgan's acquisition of Bear Sterns and Washington Mutual; Wells Fargo's $15.1 billion acquisition of Wachovia; Bank of America's $50 billion rescue package for Merrill Lynch; HBOS's £12.2 billion acquisition by Lloyd's TSB in the U.K; and the acquisition/purchase of Sachsen Landesbank by Baden-Wuerttemberg Landesbank in Germany. Government bank bailouts include the U.S. government's $700 billion rescue package (e.g., Citigroup, J.P. Morgan, Bank of America, Morgan Stanley, etc.); the British government's £500 billion bank rescue package (e.g., Northern Rock, Royal Bank of Scotland, HBOS and Lloyd's TSB, and Bradford & Bingley); the German government's €50 billion bailout of Hypo Real Estate; the Swiss government's capital injection into UBS; various European government bailouts of Fortis and Dexia; and the Dutch government's €10 billion capital injection into ING Bank. Banks were also rescued by other investors, such as Warren Buffett's $5 billion investment in Goldman Sachs and the Qatar Investment Authority's capital injection of £1.7 billion into Barclays.

[8] The Basel III Capital Accord requires banks to have 4.5 percent ratios of common equity to risk-weighted assets at all times (Common Equity Tier 1 ratio: CET1), up from the 2 percent ratio required by Basel II. Additionally, the minimum Tier 1 capital has been increased from Basel II's 4 percent of RWA to 6 percent in Basel III. This 6 percent includes the 4.5 percent CET1 ratio and 1.5 percent of additional Tier 1. Banks must also hold a total capital (Tier 1 plus Tier 2) of at least 8 percent of risk-weighted assets at all times. Basel III also requires that, during good times, banks build additional capital buffers (Common Equity Tier 1) equal to 2.5 percent of their RWAs (Capital Conservation Buffer). Moreover, during periods of excessive credit growth, macroprudential and regulatory authorities can require banks to build additional buffers of Common Equity Tier 1 capital that vary up to 2.5 percent of RWA. Besides the aforementioned capital requirements, Basel III has introduced a new mandatory standard requiring banks to maintain a minimum leverage ratio of 3 percent, calculated as the ratio of Tier 1 capital to total assets.

banks have lower funding costs and lend more, not less."[9] On March 7, 2019, the *Financial Times* reported that "The Federal Reserve has voted against activating a key buffer aimed at guarding against financial stability risks in one of a trio of decisions by U.S regulators that will be *greeted with relief by major financial groups*."[10]

The present paper contributes to this debate by empirically examining the impact of capital on banks' costs of equity. We study a large sample of banks from 62 countries over the 1991–2017 period, in order to gauge the effects of various bank capital measures on the cost of equity. Our starting point is the theoretical prediction that, as a firm shifts to a capital structure with more equity, its equity cost decreases. As debt decreases in the capital mix, equity becomes less risky, which should lead to a decrease in the risk premium required by equity holders. This, in turn, results in a lower cost of equity capital. From a bank's overall cost of funding perspective and using the Modigliani and Miller (1958) framework (M-M hereafter), we infer that, as a bank increases equity's weight in its capital structure, the equity cost decreases, making less of an impact on its weighted average cost of capital cost (overall funding cost) than would be the case were the cost of equity insensitive to capital structure. If, indeed, the cost of equity was to decrease significantly with the increase in bank equity capital, the impacts of more stringent capital requirements on banks' overall funding costs might not be as severe as bankers claim. Subsequently, any impact from higher capital requirements on the cost of credit would be (extremely) limited. In fact, throughout this paper, our empirical analyses consistently provide evidence of a robust, statistically and economically significant negative relationship between bank capital and the cost of equity. Our baseline regression estimations suggest that a one percentage point increase in the equity-to-assets ratio reduces the cost of equity by about 18 basis points. At very low bank capital levels (first quartile of our sample), the magnitude of the impact of a one percentage point increase in the equity-to-asset ratio on bank cost of equity is even larger (79 basis points).

Many authors have challenged the claim that increased equity requirements are economically costly because they lead to increases in banks' funding costs, which will subsequently be passed on to borrowers. In an open letter to the *Financial Times* in 2010, twenty prominent academics advocated the imposition of much higher capital requirements than those introduced by Basel III. They argued: "Some claim that requiring more equity lowers the banks' return on equity and increases their overall funding costs. This claim reflects a basic fallacy. Using more equity changes how risk and reward are divided between equity holders and debt holders but does not, by itself, affect funding costs... Bankers warn that increased equity requirements would restrict lending and impede growth. These warnings are

[9] Article is accessible through the following link: https://www.economist.com/finance-and-economics/2016/11/24/a-showdown-looms-over-bank-capital-rules.

[10] Emphasis added by the authors. The FT article can be accessed through this link: https://www.ft.com/content/918bc5fc-4054-11e9-b896-fe36ec32aece.

misplaced."[11] In a sweeping paper intended to illuminate the debate over capital regulation, Admati et al. (2013, p.1) assert that "the view that equity is expensive is flawed in the context of capital regulation." Part of their argument is based on the premise that greater equity in the capital mix should lower equity risk, leading to decreases in stockholders' required returns, which would not necessarily elevate a bank's overall funding cost. Given what they consider as a trivial cost of capital effect of capital requirements, Admati and Hellwig (2013) suggest that the other benefits of increasing bank capital justify setting the minimum equity-to-assets ratio at between 20 and 30 percent.

Applying the M-M model with taxes, Kashyap et al. (2010) attempt to quantify the impact of increased capital requirements on lending by assessing the cost of capital effect. Their estimations suggest that each 1 percentage point increase in capital raises a bank's weighted average cost of capital by about 2.5 basis points. They conclude that the long-run steady-state impact of increased capital requirements on lending is likely to be modest.

We investigate a scarcely addressed question in the banking empirical literature. Our central contribution is to demonstrate that the theoretical assumption that the required return on equity falls as a bank's financial leverage decreases holds empirically. By doing so, we provide evidence that, in reality, markets do spot and price the change in bank risk ensuing from additional equity in the capital mix. We, thus, provide a strong basis for using the M-M framework to quantify the effect of capital requirements on banks' costs of funding and, thereby, on their lending costs. Even in the presence of distortions, such as taxes and government deposit and debt guarantees, this framework can still be used to analyse the trade-off between the costs of additional equity (due to such distortions) and benefits (resulting from safer banking systems).

By documenting a negative empirical impact of additional capital on the cost of equity, we provide a missing piece of evidence to the debate on the funding cost's effect of higher bank capital requirements. For instance, in defending the view that higher capital requirements come at a price, Elliott (2013) argues that "Modigliani-Miller relies on markets to correctly perceive the change in relative safety that results from adding more equity to the funding mix. However, there is a chance that markets will be too sceptical in this regard, in which case, equity and debt costs will not fall as they should and total funding costs will go up more than would be required by the other factors described above. Higher funding costs would then be passed on to borrowers in whole or part." He adds: "Nonetheless, one can understand why markets may be somewhat sceptical of something on which academics assure them of the truth but have not conclusively proven with empirical evidence." This paper's findings represent a stark response to the scepticism expressed in the above statements about markets' pricing of additional bank equity capital, in line with the predictions of standard finance theory.

[11] Adamti et al. (2010): https://www.ft.com/content/63fa6b9e-eb8e-11df-bbb5-00144feab49a.

Whilst strongly advocating higher bank capital requirements, Admati et al. (2013) also question the empirical validity of the assumption that the required return on equity would fall with a rise in equity in the funding mix. They state: "Despite its fundamental importance, empirically establishing this relationship is notoriously difficult" (p.16, footnote 33). Likewise, Kashyap et al. (2010) point to the difficulty of empirically validating the assumption that investors demand lower risk premiums for holding better capitalised banks' stocks. They do, however, attempt to provide some supporting evidence by showing that the stock returns of less-leveraged banks tend to be less volatile and exhibit lower betas. Yet, they stop short of establishing a clear empirical link between these risk measures and equity returns. The work of Baker and Wurgler (2015) comes close to ours in its attempt to validate the bank-capital-cost-of-equity relationship empirically, after admitting that "the validity of the capital structure irrelevance argument is not so clear, and direct empirical evidence is lacking" (p. 2). To emphasise the lack of empirical work addressing the link between bank capital and the cost of equity, they further note that, "Admati et al. (2013) cite seven theoretical papers in the relevant section but only one empirical paper, Kashyap, Stein, and Hanson (2010), which does not estimate the cost of equity directly" (p. 2). To estimate leverage's effect on a bank's equity cost, Baker and Wurgler (2015) use a sample of U.S. banks and proceed in two stages. First, they estimate the relationship between the leverage ratio and equity beta, and then estimate the relationship between the equity beta and realised return on equity. Their results point to a positive relationship between financial leverage and equity risk (beta). However, their estimations fail to validate the presence of a positive relationship between beta and stock returns. Rather, their findings reveal that banks with lower betas have higher costs of equity.

Our paper differs from Baker and Wurgler (2015) in various respects. First, whilst they use realised stock returns as a proxy for the cost of equity, we use an ex-ante measure implied by stock prices and analysts' earnings forecasts (COE hereafter). The recent literature argues that the ex-ante cost of equity, implied by stock prices and analysts' earnings forecasts, is a better measure of cost of capital than ex post returns (see Bekaert and Harvey, 2000; Hail and Leuz, 2006; Pastor et al., 2008). Pastor et al. (2008) empirically show that the implied cost of capital outperforms realised returns in detecting a risk-return trade-off. They advocate the use of *COE* rather than realised returns because the former is forward looking, with a better capacity to capture time-varying expected returns. Li et al. (2013) show that *COE*s are better than traditional ratios at predicting future stock returns.

Additionally, whilst Baker and Wurgler (2015) focus their analysis on the U.S. banking sector, we take a global perspective and analyse the cost of capital effects of higher capital requirements on an international sample, that spans a large number of countries with various levels of economic development and different institutional setups. This global approach is of paramount importance in light of the increasing interconnectedness of national banking systems and the resulting potential vulnerabilities, which may have adverse effects beyond each banking sector's national borders. It is also important to investigate the cost of capital impact of bank capital requirements at the international level, as regulatory capital agreements are intended to be implemented globally. We also exploit our rich dataset to provide insights on the variations in bank capital ratios and cost of equity across countries, geographical regions, levels of economic development, and time periods. Finally, Baker and Wurgler (2015) use a two-step test approach to examine the empirical relationship between leverage and the cost of equity. Instead, we employ a direct empirical specification, where the cost of equity is regressed on the capital ratio and various bank- and country-level controls.

We examine the bank-capital-cost-of-equity relationship in a cross-country setting using bank-level data covering listed banks in 62 countries over the period 1991–2017 (more than 16,000 bank-year observations). Our estimations indicate that banks with higher capital ratios enjoy a significantly lower cost of equity. We also find that investors value sheer equity capital most, as other forms of capital impact the cost of equity either very slightly (other components of Tier 1 capital) or insignificantly (Tier 2 capital). Our results are robust to a battery of controls for bank- and country-level factors, cost of equity measures, sample composition, and tests that account for potential endogeneity concerns. In additional tests, we find that the magnitude of the impact of capital on bank's cost of equity is larger at banks with lower capital levels. In other words, banks with more binding (lower) capital ratios benefit more, in terms of cost of equity, from additional capital. Our findings also reveal that capital has a stronger effect on banks' cost of equity in developing countries than in advanced countries.

Our results are consistent with banking theories predicting that higher levels of bank capital lower investors' risk by: increasing the survival probability of the bank (Mehran and Thakor, 2011); enhancing banks' incentives to monitor borrowers (Holmstrom and Tirole, 1997; Allen et al., 2009; Mehran and Thakor, 2011); and raising borrower screening incentives (Coval and Thakor, 2005).[12] Our findings are also in step with recent empirical evidence pointing to the benefits of capital to bank performance: Mehran and Thakor (2011) find that higher bank capital is associated with higher market value; Demirguc-Kunt et al. (2013) report that high-capital banks earned higher returns during the GFC; and Bouwman et al. (2019) examine whether high-capital banks realise better risk-adjusted stock performance than low-capital banks and show that high-capital banks outperform low-capital banks during bad times.

This paper's findings have important policy implications. The documented evidence suggests that the theoretical assumption that equity becomes cheaper as a bank funds itself with more equity capital is, in fact, empirically valid. Considering the scarcity of such empirical evidence, our study may open the door for a more enlightened debate concerning the merits of requiring banks to hold more capital. If, in addition to a decrease in cost of equity, bank cost of debt also declines due to higher capital (as is suggested by theoretical literature and some empirical evidence), the effect of higher capital requirements on the weighted average cost of capital could be far lower than that suggested by bankers. This would be the case even in the presence of distortions, such as taxes and implicit and explicit government guarantees of bank debt. Higher capital requirements can, thus, come at little or no cost to borrowers and

[12] Thakor (2014) provides an excellent discussion of theories of bank of capital.

the benefits, in terms of financial stability, may outweigh the costs. Hence, the current actions taken by some countries to loosen bank capital regulations may be ill-advised and should be reconsidered.

The remainder of this paper is organised as follows. In Section 2, we present our data and define the main variables used in the study. In Section 3, we discuss our empirical results. Section 4 provides additional analyses and Section 5 concludes the paper.

Data and variables

Data

To examine the impact of capital on the cost of equity in the banking sector, we begin by extracting all available bank equities listed on all stock exchanges around the world from DataStream, for the period 1991–2017. We then merge this data with other data from two other databases: Institutional Brokers Earnings Services (I/B/E/S) from Thomson Reuters, which provides analyst forecast data, and Thomson Reuters and Bloomberg, which provide bank financial statement information. We further extract country variables' data from various databases, including the International Financial Statistics, World Development Indicators, Financial Structure database, etc. The result is a sample of more than 16,000 bank-year observations for 62 countries. Due to data availability, the number of observations varies from one country to another over the sample period. Likewise, the number of observations varies from one variable to another.

The implied cost of equity capital

Following Hail and Leuz (2006) and Dhaliwal et al. (2006), we measure our dependent variable, the implied cost of equity (COE), as the average estimate obtained from four different models provided by Claus and Thomas (2001); Gebhardt et al. (2001); Easton (2004); and Ohlson and Juettner-Nauroth (2005). Using the average of four estimates, rather than relying on a single model, reduces the possibility of obtaining biased results (Dhaliwal et al., 2006). The individual estimates of the implied cost of capital we obtain using the models of Claus and Thomas (2001), Gebhardt et al. (2001), Easton (2004), and Ohlson and Juettner-Nauroth (2005) are denoted r_{CT}, r_{GLS}, r_{ES}, r_{OJN} respectively. We note that r_{OJN} is estimated in a closed form solution whilst r_{CT}, r_{GLS}, and r_{ES} involve numerical techniques, wherein the solution is bounded between 0 and 100 percent.

To calculate the implied cost of equity, we use the I/B/E/S database to obtain the positive one-, two-, and three- year-ahead mean forecasted earnings per share ($FEPS_{t+j}$), as well as the long-term growth rate forecast. In line with Frankel and Lee (1998) and Hail and Leuz (2009), we substitute the missing or negative $FEPS_{t+j}$ with the historical earnings per share, estimated using the beginning of the year book value per share and the three-year median return on equity in the same year, country, and industry. In this paper, we only consider banks with sufficient I/B/E/S forecasts. We discard bank-year observations for which none of the implied cost of equity estimates converge (Easton, 2004; Claus and Thomas, 2001; and Gebhardt et al., 2001 models), or are undefined (Ohlson and Juettner-Nauroth, 2005 model).

The implied cost of capital is the discount rate (r) that equates the present value of future dividends ($D_{t+\tau}$) to the current stock price (P_t):

$$P_t = \sum_{\tau=1}^{\infty} \frac{D_{t+\tau}}{(1+r)} . \qquad (1)$$

In Appendix B, we provide a brief presentation of the four cost of equity models we rely on in this paper.

Bank capital variables

Our main test variable is bank capital. Throughout the paper, we use three alternative measures of bank capital. Our first measure of capital is a bank's financial leverage, calculated as the ratio of total equity to total assets (EQUITY). It is reasonable to assume that this is the primary measure of capital that equity investors rely on when assessing a bank's financial risk, for at least two main reasons. First, it is a simple calculation that reflects the amount of a bank's high-quality capital—with the highest loss-absorption capacity—relative to its total non-risk-weighted exposure. Second, it avoids the drawbacks of risk-weighted capital ratios, which are highly sensitive to risk weights. The latter are, in turn, sensitive to the risk models used and perceived riskiness of assets and can, therefore, change from one bank to another, and across countries for the same type of asset.[13] Hence, investors can use this simple leverage ratio to compare the financial risks of banks within a single jurisdiction, as well as across jurisdictions. The second capital measure we use is the Tier 1 regulatory capital ratio, which we obtain by dividing Tier 1 capital by risk-weighted assets (TIER1). Finally, our third measure of capital is the total capital ratio, calculated as the sum of Tier 1 and Tier 2 capital to risk-weighted assets (TOTCAP). Despite their flaws, these two ratios may be followed by equity holders, along the leverage ratio, to assess a bank's financial risk and determine the required rate of return – cost of equity. Tier 1 capital includes common stock and retained earnings, as

[13] The global financial crisis has raised questions about the ability of the risk weights used in the Basel regulatory framework to capture banks' actual risks. This has led to controversy over the common practice of relying on low-quality capital, such as Tier 2 capital, due to its limited capacity to absorb losses.

well as perpetual noncumulative preferred stock. Tier 2 capital is composed of hybrid capital, subordinated debt, revaluation reserves, and loan loss reserves.

Control variables

Our regression equations also include a number of bank- and country-level variables, intended to capture the potential effects of factors other than capital on banks' cost of equity. In particular, we allow for a set of bank-level factors that can shape investors' perceptions of a bank's risk profile and can potentially influence the risk premium they require for investing in the bank's equity. We allow for a bank's asset quality using the ratio of loan loss provisions to total loans (PROV). Banks with riskier loan portfolios set up higher provisions in order to face losses when they materialise. Equity investors may, thus, require greater compensation from banks with higher provisions (higher risks), which result in a higher cost of equity. We also include a control for a bank's quality of management, measured by the ratio of salaries and benefits to total assets. We label this variable INEFF (for inefficiency). We expect it to be positively associated with the cost of equity, as banks with higher personnel expenses per dollar of assets may be seen by investors as inefficient and penalised with a higher cost of equity. Bank earnings are closely monitored by equity investors and are expected to affect the cost of equity significantly. We, thus, include the return on assets (ROA) as another control variable in our cost of equity regression equation. We further allow for the ratio of deposits to total assets (DEP). The more deposits a bank has, the more stable its funding structure, which would reduce its susceptibility to liquidity problems (e.g., Beltratti and Stulz, 2012; Berger and Bouwman, 2013). This can, in turn, lower investors' required return on equity. As a final bank-level control, we include the natural logarithm of total assets (SIZE). Equity investors may perceive larger banks as a source of lower risk due to better asset diversification (e.g., Demsetz and Strahan, 1997) and better monitoring executed by supervisory and regulatory bodies. Additionally, larger banks may be viewed by investors as too big to fail (e.g., Deng et al. 2007; Belkhir, 2013) and the risk premiums they have to pay equity holders may be lower than those required from smaller banks.

Our second set of controls comprises country-level variables. As in prior cross-country equity cost studies (e.g., Hail and Leuz, 2006; Chen et al., 2009; Chen et al., 2011; Belkhir et al., 2019), we include the natural logarithm of GDP per capita (LGDPC), the expected inflation rate (INFL), and the level of a country's stock market development as country-level controls. Per capita GDP is used as a control for a country's income level. The latter reflects various country characteristics, such as institution(al) quality, investor protection, and regulation, which can impact investors' perceptions of bank risk. In particular, investors may be less concerned with banks located in richer countries compared to those in less rich ones. We allow for expected inflation because the higher the expected inflation rate and the higher the return on equity required to preserve a constant real rate of return for investors. We use annual realised inflation as a proxy for expected inflation. We also allow for a country's stock market development, using the ratio of stock market capitalisation to GDP (MCAP). Appendix A provides more detailed descriptions of the variables and their sources.

Summary statistics

Panel A of Table 1 reports country-by-country median values of COE and our three measures of bank capital. Column 1 of panel A reveals a large cross-country variation in the median cost of equity, with a minimum COE recorded in Australia (9.8 percent) and a maximum observed in Lebanon (25.1 percent). Likewise, columns 2, 3 and 4 show a great deal of cross-country variation in the median values of our three bank capital measures. EQUITY varies between a minimum of 3.1 percent in Belgium and a maximum of 15.7 percent in Serbia. As regards TIER1, the lowest median value is recorded in Italy (7.4 percent), whereas the largest median value is observed in Serbia (18 percent). Italy has the lowest median value of TOTCAP (11.3 percent), whilst Nigeria has the highest median value of TOTCAP (20.4 percent).

Columns 1 and 2 in panel B of Table 1, and panel A of Figure 1 trace the movement of the median values of COE and our first measure of bank capital (EQUITY) over the sample period for the full sample. They both document COE's tendency to decrease during periods of financial expansion (and stability) and to increase sharply during episodes of financial turmoil. This can be clearly seen during the 1998–2000 period (Russian and LTCM crises) and the 2008–2010 period (the GFC). Despite these momentary sharp rises in equity cost, overall, there is a cumulative fall in the cost of equity of about 3 percentage points between 1991 and 2017 (from 12.9 percent to 10 percent). By contrast, one can spot a clear upward trend in the ratio of banks' equity to assets (EQUITY). Over our sample period, there is a cumulative 4 percentage point increase in EQUITY, from 6 percent in 1991 to 10 percent in 2017. A closer look at panel A of Figure 1 and the figures reported in column 2 of panel B (Table 1) reveal that an important part of this incremental bank capital has been added since the GFC's breakout; EQUITY has increased from 8.3 percent in 2007–2008 to 10 percent in 2017. If anything, this proves that banks and regulators across the globe have sought to improve bank capitalisation in the GFC's aftermath. Columns 3 and 4 of the same table also document substantial increases in the two Basel regulatory capital ratios (TIER1 and TOTCAP) over the 27-year sample, with the gains split (roughly) evenly between the pre- and post-GFC periods.

[Insert Table 1 about here]

Panel B of Table 1 shows the median cost of equity and the median equity-to-assets ratio by year, across two subsamples (advanced economies and developing countries). Panel B of Figure 1 records the movement(s) of these two medians across the two country groups over time. Overall, we note a persistent gap of about 3 percentage points between the median bank cost of equity for developing countries and the one for advanced economies. Except during the GFC's peak (2008–2009), banks in advanced countries enjoy a lower cost of equity compared to those in developing countries. Interestingly, bank capitalisation seems to follow the same path over the years across developing and advanced countries, and the typical bank seems to operate at the same capital ratio level, whether located in a developed or developing country. Global factors, especially international capital regulation, may be thought of as the main driving forces behind this common path of bank capitalisation.

[Insert Figure 1 about here]

Panel C of Table 1 presents the sample descriptive statistics for all the variables used in our analysis of the bank-capital-cost of equity relationship. A sample bank has a mean COE of 12.1 percent (median: 10.8 percent), and a mean financial leverage ratio (EQUITY) of 8.7 percent (median: 8.3 percent). The average bank has a logarithm of total assets equal to 2.246 (median: 1.979), a ratio of loan loss provisions to loans of 76.4 percent (median: 44 percent), a ratio of salaries and benefits to assets of 1.3 percent (median: 1.3 percent), a return on assets of 1.0 percent (median 1.1 percent), and a ratio of deposits to assets of 66.8 percent (median: 71.3 percent). Furthermore, the different variables' standard deviations in the table suggest that the banks in our sample have different characteristics in terms of capitalisation, size, asset quality, profitability, liquidity, etc. The standard deviations of our country-level variables also suggest that our sample banks come from countries with varying levels of income, inflation and financial development. As previously indicated, the number of observations varies from one variable to another due to missing observations for some variables.

In panel D of Table 1, we report the Pearson correlation coefficients amongst the different variables we use in our main analysis. Consistent with (the) finance theory predictions, COE is negatively and significantly correlated (at the 99 percent level) with our three measures of bank capital, with the highest correlation coefficient observed for EQUITY (-0.09). Additionally, most of the control variables are correlated with *COE,* in line with theoretical predictions and the findings of prior empirical literature. Importantly, the control variables generally exhibit low correlations, reassuring us that multicollinearity is not a major challenge to our empirical analyses.

Empirical results

Graphical evidence

Our primary conjecture is that banks operating with more equity capital in their capital mix bear a lower cost of equity capital. As a preamble to our multivariate analysis of the bank-capital-cost of equity relationship, in this section, we present scatterplots that display the relationship between COE and our measures of bank capital. In panel A of Figure 2, we use the full sample and report a clear negative association between the cost of equity (on the Y-axis) and EQUITY (on the X-axis). This negative relationship holds when we use TIER1 (panel B) and TOTCAP (panel C) as measures of bank capital. In the remainder of Figure 2 (panels D, E, F, G, H, and I), we provide scatterplots illustrating the bank capital-cost of equity relationships for selected advanced economy countries (Germany, U.K and U.S) and developing countries (India, Malaysia and Thailand). These graphs point to the presence of a negative association between the cost of equity and bank capital in each of the selected countries. This observation holds for most of the countries in our sample. Hence, graphic evidence suggests that bank capital and the cost of equity are negatively associated. We now turn to multivariate regression techniques, to investigate the precise link between capital and the cost of equity.

[Insert Figure 2 about here]

Main evidence

In this section, we investigate bank capital's impact on the cost of equity using a multivariate regression analysis. To this end, we estimate various specifications of the regression model below. Specifically, we regress COE on a measure of bank capital (CAPITAL: EQUITY, TIER1, or TOTCAP) and a set of firm- and country-level control variables (CONTROLS):

$$COE_{i,t} = \alpha_0 + \beta_1 CAPITAL_{i,t-1} + \beta_2 CONTROLS_{i/j,t-1} + FE + \varepsilon_{i,t}. \qquad (1)$$

In the above model, $\varepsilon_{i,t}$ represents an error term and FE represents a set of country and year fixed effects. Subscripts i and j represent banks and countries, respectively. Due to the nature of our sample, which includes banks from many countries, the country and year fixed effects are intended to allow for any country- and time-specific factors that may affect banks' cost of equity, or the potential association between bank capital and the cost of equity. As indicated in Demirguc-Kunt et al. (2013), such factors may include differences in interest rates and other macroeconomic variables, cross-country disparities relating to the severity of the financial crisis and its economic repercussions, authorities' different policy responses, variations in the quality of bank regulation and supervision, and differences in accounting and regulatory standards. By including country and year fixed effects, we reduce the potential bias caused by omitted variables.

Table 2 presents our main evidence of the bank capital-cost of equity relationship. Columns 1-3 report the results of our estimations using EQUITY as a measure of bank capital. Column 1, which includes only bank-level controls, shows that, consistent with our expectations, EQUITY is negative and statistically significant at the 1 percent level. This suggests that banks with higher ratios of equity capital to assets bear lower costs of equity. This evidence is in favour of the theoretical prediction, that an increase in equity capital reduces a bank's financial risk and eventually leads investors to require lower equity returns. This, in turn, translates into lower costs of equity. The impact of EQUITY is not only statistically significant, but also economically meaningful. The coefficient estimate for EQUITY in column (1) suggests that a one standard deviation increase in EQUITY (0.039) leads to a 72-basis-point drop in the cost of equity (-0.186*0.039 = -0.0072), all else being equal. Similarly, a 10-percentage-point increase in EQUITY would reduce the cost of equity by a significant 1.86 percentage points. In columns 2 and 3, , we gradually augment the COE regression model with country-level variables. In column (2), we add the natural logarithm of GDP per capita and the inflation rate. In column (3), we further add a measure of stock market development, namely, stock market capitalisation to GDP. Adding any of these variables alters neither the statistical nor the economic significance of our main variable of interest, EQUITY. The latter continues to load negatively and statistically significant at the 1 percent level, with roughly the same economic magnitude.

Across the three models reported in columns 1-3 of Table 2, the coefficient estimates for our bank- and country-level control variables are generally consistent with our predictions and the prior literature. In particular, the positive, significant coefficient estimate for PROV suggests that the cost of equity increases as the quality of a bank's loan portfolio deteriorates. The negative and significant coefficient estimate on ROA indicates that more profitable banks enjoy a lower cost of equity. Likewise, banks with a lower liquidity risk (higher DEP) face a lower cost of equity. In addition, the coefficient estimate for SIZE is consistently negative and significant across all three COE models, implying that larger banks enjoy a lower cost of equity, all else being equal. Our estimations also reveal that banks' cost of equity depends on their home countries' income levels; as suggested by the negative and significant coefficient for LGDPC, banks located in richer countries enjoy a lower cost of equity. As expected, a rise in expected inflation is conducive to a higher bank cost of equity. Additionally, stock market development contributes to the lowering of banks' cost of equity; the coefficient estimate on MCAP is negative and significant at the 1 percent level.

In columns 4-9 of Table 2, we replicate the analyses reported in columns 1-3 using TIER1 and TOTCAP as alternative measures of bank capital. The findings suggest that using the ratio of Tier 1 capital to risk-weighted assets as an alternative bank capital measure substantiates our initial finding on the influence of bank capital on the cost of equity. Specifically, our estimates reveal a negative association between the ratio of Tier 1 capital to risk-weighted assets and the cost of equity. The coefficient estimate for TIER1 is consistently negative and significant at the 1 percent level across columns 4-6. The economic significance of TIER1's coefficient estimate is, however, smaller than EQUITY's. Using the estimated coefficient on TIER1 in column (4), a one standard deviation increase in TIER1 (0.078) translates into a mere 26-basis-point drop in the cost of equity (-0.034*0.078 = -0.0026). This is a reasonable finding, given that the additional forms of capital that enter the composition of Tier 1 capital (besides equity capital) have lower loss-absorption capacities and are, therefore, not valued by equity investors, as they value pure equity capital.

The results reported in columns 7-9 are qualitatively similar to those reported in columns 4-6. The coefficient estimate on TOTCAP is negative and significant at the 1 percent level and has the same magnitude as the coefficient on TIER1. This result suggests that the additional capital entering the composition of bank total capital on top of Tier 1 capital (i.e., Tier 2 capital) is not priced in by stockholders. Indeed, our results imply that investors perceive Tier 2 capital as having no effect on their financial risk. Overall, the results reported in Table 2 suggest that investors do not value Tier 2 capital and their perceived financial risk is only affected by sheer equity and, to a lesser extent, by the other components of Tier 1 capital. To validate this inference, we re-estimate the cost of equity model, using the ratio of Tier 2 to risk-weighted assets as a measure of bank capital. Our results (unreported) confirm that Tier 2 capital is not a factor that determines banks' cost of equity; the coefficient estimate on Tier 2 capital is statistically insignificant at the conventional level.

In summary, our estimations indicate that a bank's cost of equity declines with the amount of equity capital with which it operates. In other words, as predicted by financial theory, equity capital lowers a bank stockholder's financial risk, which eventually leads to a lower cost of equity. This result holds, even when we allow for various bank- and country-level factors that may affect banks' cost of equity.

[Insert Table 2 about here]

Robustness checks

In this section, we subject our main finding of a negative impact of bank capital on the cost of equity to a variety of robustness tests. We first check the robustness of our results to additional control variables. Next, we use alternative measures of the cost of equity to check whether our findings are sensitive to the use of the specific cost of equity measure, COE. We then estimate the cost of equity model, using alternative methods to address potential endogeneity issues that might have biased our initial results. Finally, we test the robustness of our results with the composition of our sample. Interestingly, our main results are robust to all these checks.

Table 3 reports our estimation results when we include additional control variables. In columns 1- 6 , we add controls for market risk, as this has been shown by prior literature to impact the cost of equity (e.g., Botosan et al., 2011; Chen et al., 2016). In particular, in columns 1-3 , we use the standard deviation of a bank's stock returns (RSTD) as a measure of market risk and include it as an additional variable in our cost of equity model. The coefficient estimate on RSTD only appears positive and significant at the 1 percent level in column 1, where we use EQUITY as a measure of capital. Our main variable of interest, EQUITY, TIER1, or TOTCAP, continues to have a negative and significant association with COE across columns 1-3 . In columns 4-6 , we replace RSTD with the stock beta, BETA, as a measure of the market risk of equity. The BETA coefficient is positive and highly significant across columns 4-6 , regardless of the bank capital measure we use. This result is consistent with theoretical predictions, suggesting that a firm's cost of equity should rise with its systematic risk. Importantly, the coefficient estimates for our three bank capital variables continue to be negative and significant. The economic impacts of EQUITY, TIER1, and TOTCAP on the cost of equity are the same as those reported in Table 2. This result suggests that, apart from the indirect effect it might exert through stock beta (as suggested by Baker and Wurgler, 2015), bank capital has a significant direct effect on a bank's cost of equity. In columns 7-0 , we include the stock market turnover, MTOV, as a control for stock market liquidity. Prior literature on non-banking firms' cost of equity suggests that firms listed in stock markets with a higher liquidity levels face lower costs of equity (e.g., Belkhir et al., 2019; Saad and Samet, 2017). Our estimations in column (7) corroborate this finding for banking firms. Using EQUTIY as a measure of bank capital, we estimate a negative and significant impact of MTOV on bank cost of equity. Yet, this does not alter our main conclusion concerning the bank-capital-cost of equity relationship, as we continue to find a negative and significant coefficient estimate for each of the bank capital variables (EQUITY, TIER1 and TOTCAP).

In columns 10-12 , we report the results of adding the ratio of non-performing loans to total loans (NPL) as a control variable for the quality of a bank's assets. Our estimations show that NPL is positively and highly significantly associated with COE, suggesting that banks with more non-performing loans incur a higher cost of equity. This, however, does not affect our main finding of a negative and significant relationship between our three measures of bank capital and the cost of equity; we continue to report negative coefficient estimates for EQUITY, TIER1 and TOTCAP. Finally, in line with Berger et al. (2018), in columns 13-15 , we allow l for a bank's book-to-market ratio (BTM) and find that banks with higher BTMs bear a higher cost of equity. Nonetheless, the reported negative association between bank capital and the cost of equity is unaffected by this additional control variable.

[Insert Table 3 about here]

In Table 4, we investigate whether our results are sensitive to the specific cost of equity measure we have used so far. As a reminder, COE is calculated as the arithmetic average of four implied cost of equity measures (r_{CT}, r_{GLS}, r_{ES}, r_{OJN}). To alleviate the potential effect of this specific cost of equity measure on our results, we re-estimate the cost of equity model using different measures. In columns 1-12 , we verify that our results continue to hold if we use the individual measures of the cost of equity, instead of the average of the four measures. The reported results reveal that bank capital (EQUITY, TIER1, and TOTCAP) has a negative and significant effect on each of the individual cost of equity measures.

[Insert Table 4 about here]

It is worth noting that the estimations of r_{CT} and r_{OJN} assume a long-term growth rate that is computed using the yearly one-year-ahead realised inflation rate. This makes r_{OJN} and

r_{CT} especially sensitive to the choice of the long-term growth rate. By contrast, the estimations of r_{ES} and r_{GLS} do not require assumptions about the growth rate beyond the forecast horizon. This concern does not bias our findings, since the results reported for r_{CT} and r_{OJN} (Table 4) are similar to those for r_{ES} and r_{GLS}. To further ensure the robustness of our results, in columns 13-15 , we re-estimate our cost of equity model using the principal component for r_{ES} and r_{GLS}. This does not affect our conclusions, as we continue to report negative and significant coefficients for EQUITY, TIER1, and TOTCAP. Furthermore, in columns 16-18 , we calculate the principal component of the four cost of equity and use it as our dependent variable. The estimations indicate that our three bank capital measures continue to load as negative and statistically significant. Together, the results reported in Table 4, alleviate any concerns that our initially reported result of a negative and significant association between bank capital and the cost of equity might have been driven by the way we measure the cost of equity.

Our sample spans the period 1991–2017, which is characterised by a steady decline in interest rates globally (e.g., Del Negro et al., 2018). One might reasonably suspect that this movement might have driven down required equity returns. Figure 1 suggests that our sample period is also characterised by an upward movement in equity-to-assets' ratios. It is, thus, concerning that these two opposite movements over time might be driving the negative association we uncover between capital ratios and bank cost of equity, potentially generating spurious findings. To ensure that our results are not caused by the declining interest rate environment, all our regression equations include year dummy variables that allow for unobserved time factors that may drive banks' COE. Additionally, in panel B of Table 4, we present the results of our estimations of the cost of equity model, using the risk premium (RPM) as a dependent variable rather than COE. We calculate RPM as the difference between COE and the 10-year U.S. Treasury bond yield. Our results suggest that the risk premium is negatively and significantly associated with each of our three capital measures, alleviating the concern that our initial finding of a negative relationship between bank capital and the cost of equity is driven by the low interest rate environment.

The results we have reported so far might also have been affected by the choice of empirical method used to estimate our cost of equity model. We are particularly concerned that our results suffer from a bias caused by potential bank capital endogeneity. To mitigate this concern, we re-estimate the cost of equity model using three different methods. First, we calculate the bank average of each variable throughout the sample period and estimate the same regression model as the one in Table 2. By construction, the averages of these variables, particularly the capital variables, are less likely to be endogenously determined with the cost of equity. We report the results in Table 5, columns 1-3 of panel A. These results continue to support our prior finding that bank capital has a negative, significant influence on the cost of equity. Specifically, we find that the average cost of equity is negatively influenced by the bank capital average. This result is valid, whether we use EQUITY, TIER1, or TOTCAP as a measure of bank capital.

[Insert Table 5 about here]

Second, to confirm that the relationship between bank capital and the cost of equity is not time-dependent, we estimate Fama-McBeth regressions. First, we estimate yearly cross-sectional regressions with similar specifications to those described in our base regression models in columns 3, 6 and 9 of Table 2. Second, we calculate the time-series averages of the yearly cross-sectional coefficients on bank capital and the other explanatory variables. We correct heteroscedasticity and autocorrelation in the coefficients' time-series and report the Newey-West adjusted *t*-stats. Significant coefficients indicate that bank capital has predictive power in explaining the cross section of the cost of equity. The estimation outputs of the Fama-MacBeth regressions are presented in columns 4-6 of Panel A in Table 5. As shown in panel A of Table 5, our findings continue to support the presence of a negative and significant effect of capital on banks' cost of equity.

Third, we address the concern that both cost of equity and bank capital variables are jointly and endogenously determined (contemporaneous relation) due to potential missing explanatory variables by estimating two-stage least square, 2SLS, regression models (e.g. Jayaraman and Milbourn, 2012). In the first step, we instrument the bank capital measures with their averages, which are computed at the country-year level, whilst excluding the focal bank. To ensure that the focal bank is not biasing our instruments, and that the latter are completely exogenous to the bank under examination, we calculate the instruments for every bank by taking the country-year bank capital (EQUITY, TIER1, TOTCAP) averages across all remaining banks. We run key diagnostic tests on the appropriateness of the employed instruments, which we use in the 2SLS's first step. Following Sanderson and Windmeijer (2016), we assess the relevance and strength of the instrument by conducting under-identification and weak identification tests. The under-identification test examines whether the instrument is relevant, whereas the weak identification test determines whether the instrument is weak. We use the Anderson (1951) canonical LM statistic for the under-identification test. Our results show that this test rejects the null hypothesis of under-identification. Having rejected the instruments' under-identification, we then test whether our model is weakly identified (i.e. the instruments are weak). Based on the Cragg-Donald (1993) statistic, we reject the null hypothesis that the equations for bank capital instruments are weakly identified. Based on the result that the instruments for the capital variables' instruments are relevant and strong, we re-estimate our cost of equity model using the 2SLS. The results of the second stage estimation are reported in columns 7-9 of panel A in Table 5. These results suggest that our main finding continues to hold. In particular, we continue to find a positive and significant coefficient estimate (EQUITY, TIER1, and TOTCAP), supporting the finding that capital has a negative impact on the cost of equity. Overall, the above results mitigate any concerns that our inferences of a negative effect of bank capital on the cost of equity are biased by the potential endogeneity of bank capital.

One potential concern for our empirical analysis is that our results may be driven by our sample's country composition. In particular, about half the observations in our sample are U.S bank-years. We, therefore, investigate whether our initial findings are driven by U.S banks by excluding the latter from the sample. The results of this estimation are reported in panel B of Table 5. They indicate that the negative relationship between bank capital and the cost of equity holds for banks outside the U.S. We further supplement this result with an estimation of the bank capital-cost of equity relationship in the sample of U.S banks. We find a negative and significant coefficient estimate on each of our three bank capital measures.

In summary, our evidence of a negative and significant impact of bank capital on the cost of equity survives a variety of robustness tests.

Additional analyses

Having established clear, robust evidence that bank cost of equity falls with capital, especially equity capital, we now investigate this effect in more detail. We conduct a number of additional tests that better enlighten us on the workings of the documented cost of equity effect of bank capital. First, we consider whether the negative capital-cost of equity relationship is stronger for banks with more binding capital constraints. Second, we explore the differences that might exist in the strength of this relationship across developed countries and developed ones. Third, we analyse the capital-cost of equity relationship for large and small banks, separately.

Low vs. high bank capitalisation

Whilst the empirical evidence we presented so far points to a negative impact of capital on banks' cost of equity across the bank spectrum, the magnitude of this impact may, nevertheless, depend on the particular bank's level of capitalisation. Specifically, investors may give more value to additional capital at less capitalised banks. This is because, at a low capital level, regulatory capital requirements are likely (to be) binding, and the likelihood of banks breaching the regulatory minimum capital level is high. Hence, at a low capitalisation level, additional capital lowers equity holders' financial risk more than it would at a high capital level (at which a bank has far more than the minimum capital required). Capital's impact on the cost of equity is, therefore, expected to be greater at low capitalisation levels. To examine this conjecture, we run two separate tests. In the first, we estimate the COE model for two subsamples: one that includes observations where the measure of capital is below its country-year median and another subsample containing observations whose capital measure is above the country-year median.[14] We then compare the magnitudes of the coefficients' effects on the bank capital measures across the two subsamples. In the second test, we perform a quartile regression estimation to verify whether the COE-bank-capital relationship varies across the four bank capital quartiles.

The results of our first test are reported in panel A of Table 6. Whilst the coefficient estimates for the bank capital measures are consistently negative and highly significant across the table's six columns, the results clearly indicate that bank capital has a much stronger effect on the cost of equity for the subsample of observations with capital below the sample median. For instance, the coefficient estimate on EQUITY in the below-median subsample – column 1 – is more than twice its estimate in the above-median subsample (column 2). To confirm this result, we perform the difference in coefficients *t*-test between below-median and above-median subsamples. We rely on the *t*-statistic, which is equal to the difference between EQUITY coefficients across the two subsamples divided by the square root of the sum of each coefficient's squared standard error. Based on the one-tailed *t*-statistic, the decrease in the cost of equity is statistically higher for low-capitalised banks than for those with higher capital ratios.[15]

[Insert Table 6 about here]

The results of the quartile regression estimations are presented in panel B of Table 6. They suggest that the relationship between bank capital and the cost of equity is nonlinear. For instance, the coefficient estimate for EQUITY in the first quartile is more than threefold its estimate in the second and third quartiles and more than tenfold its estimate in the fourth quartile. The marginal impact of capital on bank cost of equity is, thus, much stronger for banks operating with low levels of capital than for those with high capitalisation. In fact, column 1 of panel B in Table 6 suggests that a one percentage point increase in the equity ratio of a bank operating with very low capital (first quartile) lowers its cost of equity by a significant 79 basis points. This result indicates that, at least at low levels of capital, more stringent capital requirements may not cause a rise in banks' overall funding costs.

Advanced *vs*. Developing countries

The graphic analysis we presented in Section 2 suggests that bank capitalisation in developing countries has kept pace with that of advanced economies. Yet, investors' valuations

[14] In other words, in each year, and for each country, we calculate the capital measure's median value and use it to separate observations for that specific year and country into two subsamples.

[15] We also perform the below-above-median tests of the impact of capital on bank COE by splitting observations in two subsamples, based on the median value of the capital measure – EQUITY, TIER1, and TOTCAP – of the full sample. Our results point to a stronger impact of bank capital on the cost of equity in the below-median subsample relative to the above-median subsample.

of bank capital may differ across the two (country) groups. In particular, at the same capital level, equity investors may deem a bank located in a developing country to be much riskier than a bank located in a developed one. The difference in risk perception may be influenced by the higher quality and stricter enforcement of bank regulations in advanced economies, the greater soundness of the banks' balance sheets, etc. To explore the potentially different cost of equity effect of bank capital for developed and developing countries, we estimate the cost of equity model for two separate subsamples: one that includes developed countries' banks, and another, which includes developing countries' banks. Our estimations' results are presented in panel C of Table 6. They suggest that more capital lowers a bank's cost of equity, regardless of whether the bank is located in a developed or developing country; the coefficient estimates on the capital measures load negative and significantly across the two subsamples. However, the magnitude of this effect is higher for developing countries (columns 2, 4, and 6); the coefficient estimates for EQUITY, TIER1, and TOTCAP are much higher in the sample, including banks from developing countries than in the sample of advanced economies' banks. The difference in EQUITY coefficients *t*-test between developing and developed countries confirms this conclusion. In summary, our estimations point to a stronger effect of capital on banks' cost of equity in developing countries.

3.1. Small *vs*. large banks

In this section, we explore whether there is any difference in the capital-cost of equity relationship between small and large banks. To this end, we split our sample into two groups: small banks (those with total assets below the sample median) and large banks (those with total assets above the sample median). We then run separate regressions for small and large banks. The results, reported in panel D of Table 6, show that our main conclusions continue to hold for both bank sets. In summary, our results do not seem to be driven by bank size.

Conclusion

By investigating the empirical relationship between bank capital and the cost of equity, our paper contributes to the debate over the merits and costs of increased bank capital. Whilst some academics and policymakers argue in favour of increasing bank capital requirements, others, especially bankers, point out that such increased capital requirements can only drive up banks' funding costs. The latter fails to realise that additional equity in a bank's capital mix is likely to lower risk and induce a decrease in the cost of equity. This can, in turn, limit any rise in the overall cost, if at all. This standard finance theory prediction represents a major building block for assessing the potential impact of additional equity capital requirements on a bank's funding costs. Yet, to our knowledge, no empirical work has attempted to validate this theoretical prediction.

We bridge this gap in the literature by examining the effect of bank capital on the cost of equity, using a sample of banks from 62 countries over a 27-year period (1991–2017). Consistent with theory, our results suggest that banks operating with higher equity ratios enjoy a lower cost of equity. Using a variety of bank- and country-level controls, different estimation techniques, and a battery of other robustness tests, we find that the effect of increased capital on banks' cost of equity is consistently negative and statistically and economically significant. In our baseline estimations, we find that a one percentage point increase in a bank's equity-to-assets ratio drives down its cost of equity by 18 basis points. The impact of bank capital on the cost of equity is even larger for low capitalised banks. As we move to the lowest quartile of bank capital in our sample, the effect of a one percentage point increase in a bank's equity-to-assets ratio decreases by 79 basis points.

Our paper is of interest to developing and developed countries alike, but specifically to Middle East and North African (MENA) countries, with Lebanon presenting the highest median banks' cost of equity capital worldwide. Our sample includes several MENA countries, such as Bahrain, Egypt, Jordan, Kuwait, Lebanon, Morocco, Qatar, Saudi Arabia, Tunisia and the United Arab Emirates. These countries consider ways to promote more rapid and lasting economic growth that can be achieved through reforms of the financial sector and enhancement of the performance of their banks.

The findings of this paper should help advance the debate over the benefits of higher capital ratios in the banking industry. In particular, within a Modigliani-Miller framework, our results suggest that higher equity capital requirements should not necessarily lead to hikes in banks' overall funding costs, because the cost of equity turns out to be sensitive to banks' equity capital levels. If one also accounts for the likely decrease in banks' borrowing costs in the presence of higher equity capital, then, at worst, the overall funding cost does not rise, and, at best, it decreases. Further research is, however, needed to analyse the cost of debt and the overall cost of funding effect of higher bank capital, before a verdict on the implications of more stringent capital requirements for banks' cost of funding, lending and real activity might be pronounced.

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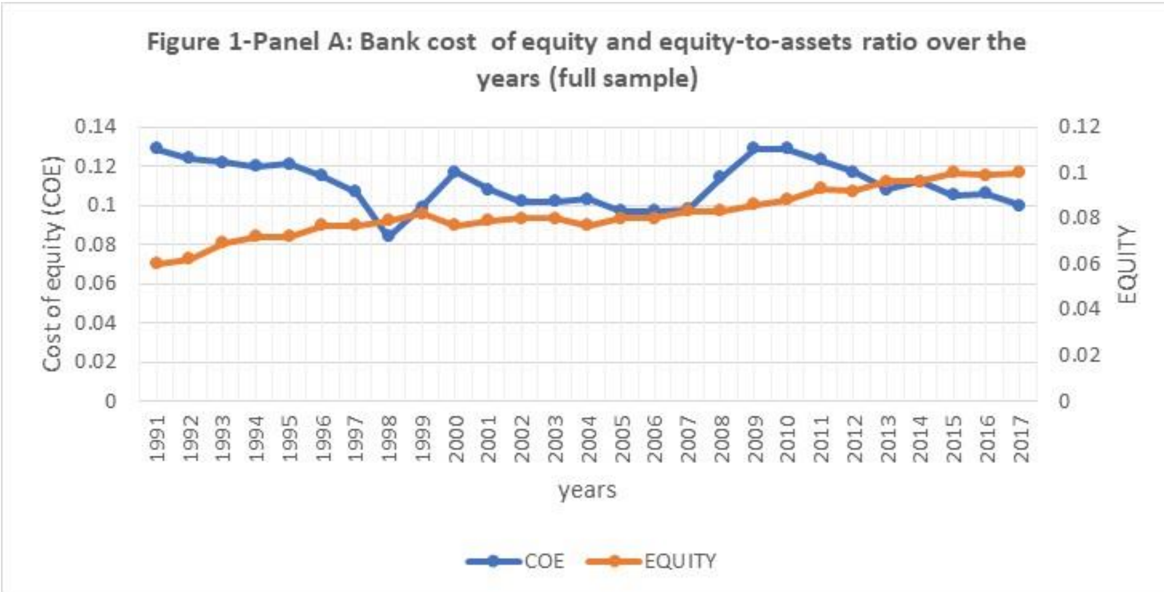
Figure 1: Bank cost of equity and equity-to-assets ratio



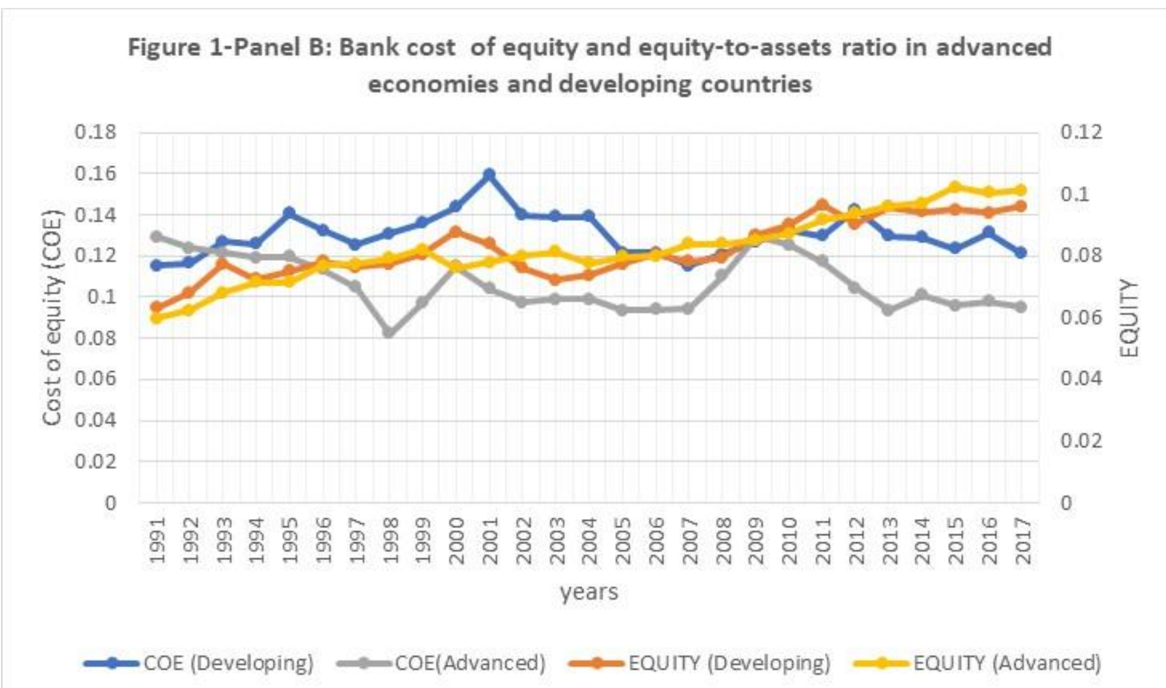
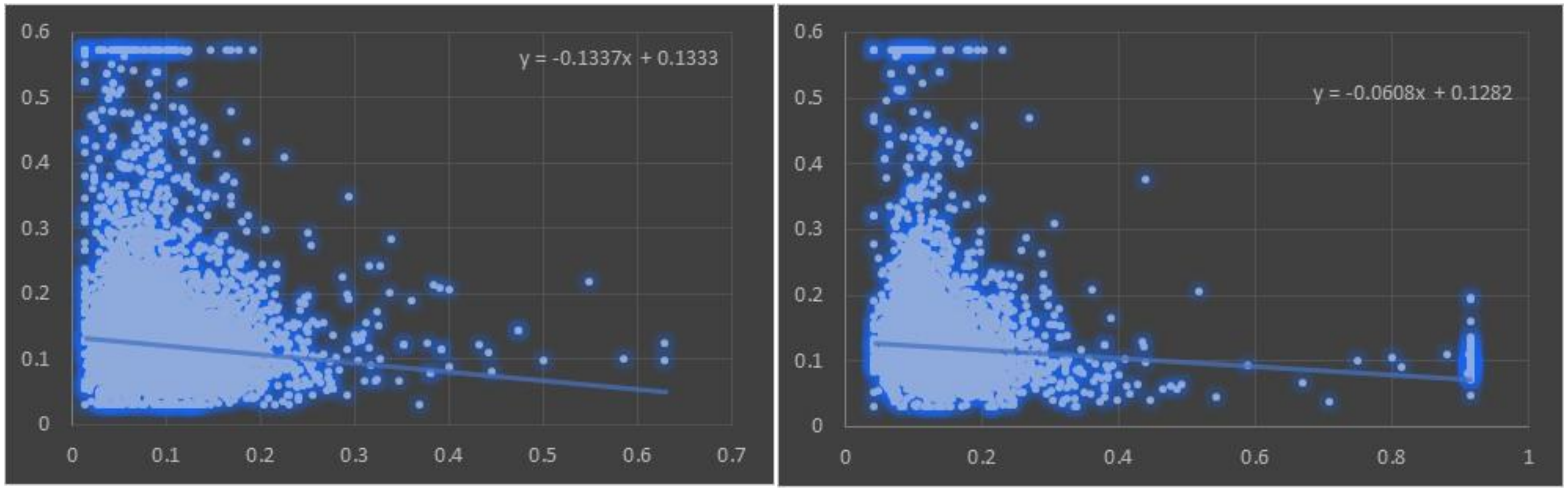
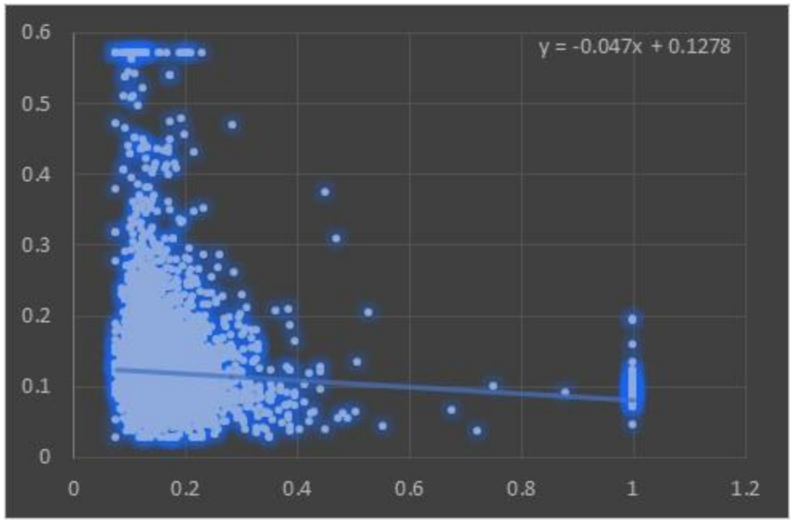


Figure 2: Cost of Equity (Y-axis) *vs*. Bank Capital (X-axis)

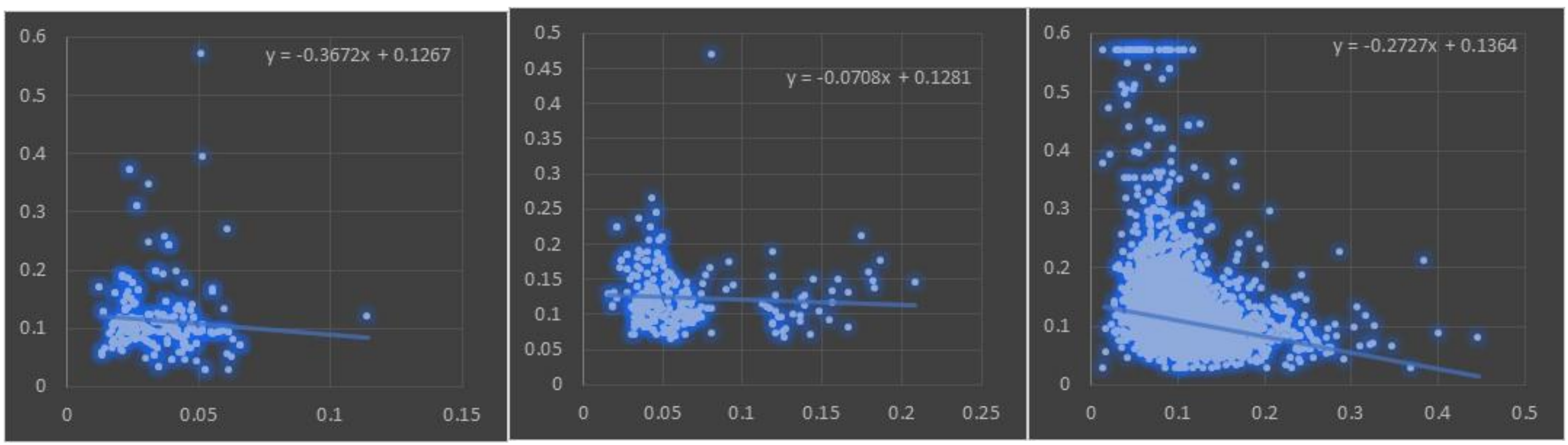


Panel A: Cost of Equity (Y-axis) *vs*. EQUITY (X-axis) – full sample **Panel B: Cost of Equity (Y-axis) *vs*. TIER1 (X-axis) - full sample)**

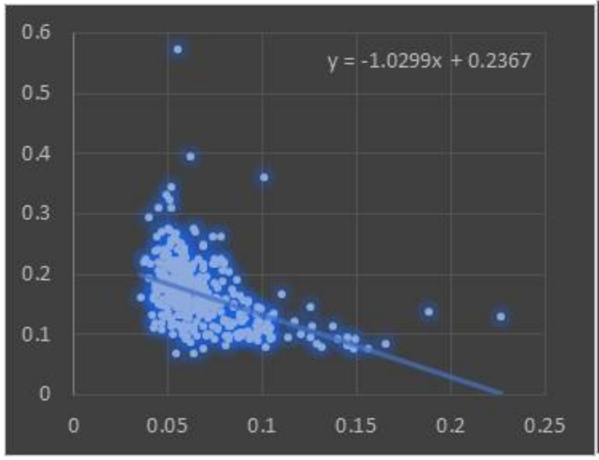


Panel C: Cost of Equity (Y-axis) *vs.* TOTCAP (X-axis) - full sample

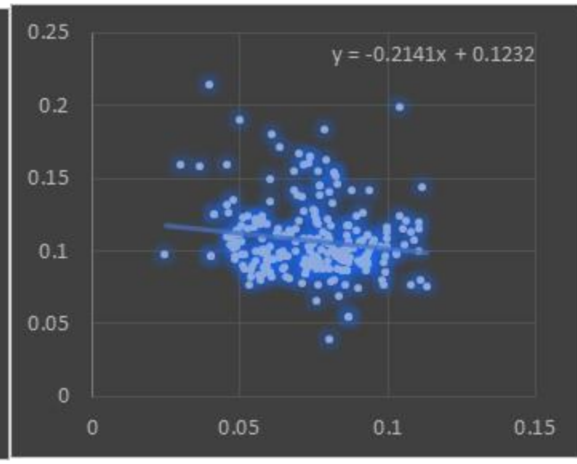
Figure 2 (continued): Cost of Equity (Y-axis) *vs.* EQUITY (X-axis) – selected countries



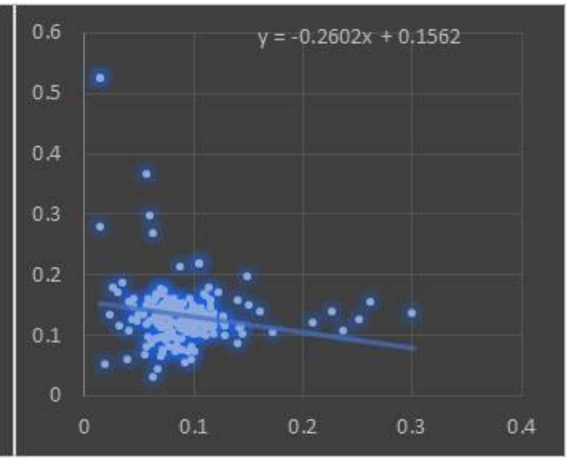
Panel D: Germany



Panel E: UK



Panel F: U.S



nel G: India

Panel H:ded Malaysia

Panel I: Thailand

Table 1. Descriptive statistics and correlation matrix

This table reports descriptive statistics and Pearson's correlation coefficients for the variables used in the main regressions. Panel A reports the medians (*Median*) and the number of observations (*N*) by country of the main variables used in our regressions. Panel B reports the medians (*Median*) and the number of observations (*N*) by year of the main variables used in our regressions. Panel C reports descriptive statistics for all the explanatory variables. In Panel C, the labels *Mean*, *P25*, *P50*, *P75*, *STD*, and *N* stand for the mean, the 25th percentile, the median, the 75th percentile, the standard deviation, and the number of observations. Panel D reports Pearson's correlation coefficients for the main variables. In Panel D, correlation coefficients in bold are significant at the 1% level. The total sample consists of 16,776 observations from 62 countries between 1991 and 2017. Appendix A provides definitions and data sources for all the variables.

Panel A. Medians of the main variables by country

	COE	COE	EQUITY	EQUITY	TIER1	TIER1	TOTCAP	TOTCAP
Country	**Median**	**N**	**Median**	**N**	**Median**	**N**	**Median**	**N**
Argentina	0.124	75	0.093	75	.	-	.	-
Australia	0.098	261	0.061	261	0.081	153	0.115	153
Austria	0.114	141	0.049	141	0.108	83	0.156	83
Bahrain	0.108	21	0.107	21	0.174	17	0.186	17
Belgium	0.111	127	0.031	127	0.098	66	0.146	61
Brazil	0.142	36	0.060	36	0.159	14	0.173	14
Canada	0.105	270	0.051	270	0.109	173	0.140	168
Chile	0.113	103	0.078	103	0.094	54	0.133	24
China	0.140	181	0.061	181	0.095	172	0.122	164
Colombia	0.174	31	0.114	31	0.088	2	0.136	2
Czech Republic	0.118	19	0.075	19	0.137	7	0.146	7
Denmark	0.125	195	0.062	195	0.098	81	0.127	76
Egypt	0.156	80	0.088	80	0.130	47	0.143	46
Finland	0.136	69	0.050	69	0.082	33	0.117	33
France	0.116	270	0.035	270	0.095	89	0.130	88
Germany	0.100	317	0.032	317	0.089	131	0.133	123
Greece	0.126	329	0.063	329	0.102	108	0.120	92
Hong Kong	0.134	85	0.102	85	0.130	28	0.180	28
Hungary	0.138	45	0.105	45	0.141	18	0.181	18
India	0.160	371	0.062	371	0.096	158	0.130	158
Indonesia	0.125	322	0.099	322	0.153	214	0.184	214
Ireland	0.106	74	0.053	74	0.082	43	0.122	42
Israel	0.128	120	0.055	120	0.080	95	0.130	95
Italy	0.119	692	0.062	692	0.074	330	0.108	327
Japan	0.104	65	0.048	65	0.131	21	0.156	17
Jordan	0.122	24	0.129	24	0.173	17	0.170	15
Kazakhstan	0.243	10	0.131	10	0.162	9	0.194	9
Kenya	0.178	16	0.139	16	0.152	14	0.165	14

Kuwait	0.112	24	0.117	24	0.144	13	0.155	13
Lebanon	0.251	25	0.084	25	0.135	22	0.141	22
Malaysia	0.101	271	0.077	271	0.114	155	0.148	155
Mauritius	0.123	10	0.136	10	0.130	7	0.149	5
Mexico	0.111	50	0.106	50	0.127	16	0.153	15
Morocco	0.106	29	0.087	29	.	-	.	-
Netherlands	0.115	38	0.072	38	0.133	20	0.146	20
Nigeria	0.221	86	0.134	86	0.174	67	0.204	66
Norway	0.113	333	0.068	333	0.120	235	0.139	224
Oman	0.126	44	0.119	44	0.125	43	0.152	43
Pakistan	0.154	76	0.082	76	0.110	45	0.150	45
Peru	0.169	25	0.083	25	.	-	.	-
Philippines	0.111	232	0.122	232	0.137	106	0.166	106
Poland	0.105	184	0.108	184	0.142	71	0.150	64
Portugal	0.116	155	0.045	155	0.086	73	0.113	67
Qatar	0.120	52	0.130	52	0.157	51	0.163	43
Russian Federation	0.201	39	0.101	39	0.104	34	0.139	34
Saudi Arabia	0.112	105	0.137	105	0.151	104	0.173	104
Serbia	0.242	5	0.157	5	0.180	3	0.187	3
Singapore	0.102	141	0.095	141	0.132	116	0.170	116
South Africa	0.133	151	0.066	151	0.126	80	0.148	77
South Korea	0.136	97	0.064	97	0.104	20	0.131	19
Spain	0.113	397	0.060	397	0.088	180	0.125	176
Sri Lanka	0.156	74	0.091	74	0.123	36	0.142	35
Sweden	0.104	178	0.042	178	0.076	101	0.114	101
Switzerland	0.100	382	0.070	382	0.163	214	0.187	116
Thailand	0.126	219	0.087	219	0.111	155	0.151	155
Tunisia	0.114	39	0.081	39	.	-	.	-
Turkey	0.153	213	0.112	213	0.152	87	0.178	87
Ukraine	0.231	8	0.131	8	0.134	5	0.208	5
United Arab Emirates	0.133	110	0.118	110	0.160	105	0.188	104
United Kingdom	0.117	239	0.045	239	0.086	180	0.144	180
United States	0.100	8,370	0.092	8,370	0.122	4,477	0.137	4,466
Vietnam	0.106	26	0.077	26	.	-	.	-
Total	**0.108**	**16,776**	**0.083**	**16,776**	**0.118**	**8,998**	**0.139**	**8,754**

Panel B. Median values of COE, EQUITY, TIER1 and TOTCAP by year.

	COE	COE	EQUITY	EQUITY	TIER1	TIER1	TOTCAP	TOTCAP	COE (Developing)	EQUITY (Developing)	COE (Advanced)	EQUITY (Advanced)
Year	**Median**	**N**	**Median**	**N**	**Median**	**N**	**Median**	**N**	**Median**	**Median**	**Median**	**Median**
1991	0.129	239	0.060	239	.	-	.	-	0.115	0.063	0.129	0.060
1992	0.124	293	0.062	293	0.058	1	0.090	1	0.116	0.068	0.124	0.062
1993	0.122	365	0.069	365	0.059	6	0.099	6	0.126	0.077	0.122	0.068
1994	0.12	408	0.072	408	0.079	7	0.129	7	0.125	0.072	0.119	0.0718
1995	0.121	495	0.072	495	0.081	8	0.131	8	0.140	0.075	0.120	0.072
1996	0.115	559	0.077	559	0.083	10	0.127	9	0.132	0.078	0.113	0.077
1997	0.107	644	0.077	644	0.078	11	0.131	11	0.125	0.076	0.105	0.0777
1998	0.084	711	0.079	711	0.073	16	0.127	16	0.131	0.077	0.082	0.0797
1999	0.099	748	0.082	748	0.074	19	0.126	19	0.135	0.081	0.097	0.0827
2000	0.117	671	0.077	671	0.078	46	0.116	44	0.143	0.088	0.115	0.0767
2001	0.108	676	0.079	676	0.082	119	0.120	113	0.159	0.084	0.104	0.078
2002	0.102	666	0.080	666	0.087	131	0.125	124	0.139	0.0764	0.097	0.0808
2003	0.102	641	0.080	641	0.091	226	0.125	218	0.139	0.0724	0.099	0.081
2004	0.103	651	0.077	651	0.103	413	0.131	395	0.139	0.074	0.099	0.078
2005	0.097	676	0.080	676	0.107	559	0.126	539	0.121	0.0774	0.093	0.080
2006	0.097	734	0.080	734	0.105	630	0.124	614	0.121	0.0804	0.094	0.080
2007	0.098	718	0.083	718	0.104	610	0.123	595	0.115	0.0784	0.094	0.084
2008	0.114	697	0.083	697	0.1	599	0.120	585	0.120	0.0794	0.110	0.084
2009	0.129	688	0.086	688	0.109	603	0.130	589	0.126	0.087	0.130	0.085
2010	0.129	731	0.088	731	0.121	644	0.143	629	0.133	0.090	0.125	0.087
2011	0.123	699	0.093	699	0.129	628	0.150	611	0.129	0.0975	0.117	0.092
2012	0.117	689	0.092	689	0.13	619	0.154	602	0.142	0.090	0.105	0.094
2013	0.108	647	0.096	647	0.134	583	0.156	565	0.130	0.096	0.094	0.096
2014	0.112	676	0.096	676	0.132	607	0.151	594	0.129	0.094	0.101	0.097

2015	0.105	680	0.100	680	0.13	622	0.149	610	0.123	0.095	0.096	0.102
2016	0.106	703	0.099	703	0.128	654	0.147	637	0.131	0.094	0.098	0.101
2017	0.100	671	0.100	671	0.129	627	0.150	613	0.121	0.096	0.095	0.101
Total	**0.108**	**16,776**	**0.083**	**16,776**	**0.118**	**8,998**	**0.139**	**8,754**	**0.128**	**0.087**	**0.103**	**0.081**

Panel C. Full sample summary statistics of the main variables used in the regression analysis.

Variable	Mean	P25	P50	P75	STD	N
COE	0.121	0.091	0.108	0.134	0.058	16,776
EQUITY	0.087	0.062	0.083	0.104	0.039	16,776
TIER1	0.130	0.098	0.118	0.142	0.078	8,998
TOTCAP	0.153	0.121	0.139	0.164	0.077	8,754
SIZE	2.246	0.638	1.979	3.688	2.051	16,776
PROV	0.764	0.190	0.440	0.960	1.028	16,776
INEFF	0.013	0.009	0.013	0.016	0.006	16,776
ROA	0.010	0.005	0.011	0.013	0.029	16,776
DEP	0.668	0.570	0.713	0.800	0.173	16,776
LNGDPC	10.054	9.970	10.403	10.746	1.046	16,776
INFL	0.032	0.016	0.027	0.034	0.034	16,776
MCAP	0.955	0.570	1.070	1.306	0.493	16,776

Panel D. Correlation matrix

	COE	EQUITY	TOTCAP	TIER1	SIZE	PROV	INEFF	ROA	DEP	LNGDPC	INFL	MCAP
COE	1.000											
EQUITY	**-0.090**	**1.000**										
TOTCAP	**-0.062**	**0.306**	**1.000**									
TIER1	**-0.081**	**0.380**	**0.968**	1.000								
SIZE	**0.066**	**-0.389**	**-0.110**	**-0.205**	1.000							
PROV	**0.378**	**0.032**	-0.008	**-0.034**	**0.087**	1.000						
INEFF	**0.044**	**0.210**	**0.037**	**0.071**	**-0.314**	**0.136**	1.000					
ROA	**-0.142**	**0.343**	**0.132**	**0.134**	**-0.098**	**-0.292**	**0.147**	1.000				
DEP	**-0.056**	**0.197**	0.015	**0.076**	**-0.485**	**-0.050**	**0.263**	**0.076**	1.000			
LNGDPC	**-0.242**	**-0.022**	**-0.040**	0.021	**-0.052**	**-0.265**	**-0.041**	**-0.214**	**-0.061**	1.000		
INFL	**0.306**	**0.095**	**0.038**	0.008	**-0.054**	**0.167**	**0.199**	**0.284**	0.015	**-0.527**	1.000	
MCAP	**-0.283**	**0.137**	**0.043**	**0.105**	**-0.189**	**-0.290**	-0.011	0.011	**0.269**	**0.440**	**-0.363**	1.000

Table 2. The relationship between bank cost of equity and capital measures.

This table reports cross-sectional regression results of the following model: $COE_t = \alpha_0 + \beta_1 CAPITAL_{t-1} + \beta_2 CONTROLS_{t-1} + FE + \varepsilon_t$. The dependent variable COE is a proxy for the cost of equity calculated as the average of the four implied cost of capital models described in Section 2.2. The $CAPITAL_{t-1}$ variables consist of either lagged *EQUITY*, or *TIER1*, or *TOTCAP*. The set of control variables ($CONTROLS_{t-1}$) consist of lagged bank-level and/or lagged country-level variables. FE is the set of fixed effects dummy variables at the country and/or year levels. The lagged bank-level control variables are: PROV, INEFF, ROA, DEP, and SIZE. The lagged country-level control variables are: LNGDPC, INF, and MCAP. The total sample consists of 16,776 observations from 62 countries between 1991 and 2017. Appendix A provides definitions and data sources for all the variables. Beneath each coefficient is the robust t-statistic. $*$, $**$, and $***$ indicate significance at the 10%, 5%, and 1% levels, respectively.

VARIABLES	(1) *COE*	(2) *COE*	(3) *COE*	(4) *COE*	(5) *COE*	(6) *COE*	(7) *COE*	(8) *COE*	(9) *COE*
EQUITY	-0.186***	-0.186***	-0.175***						
	(-9.670)	(-10.085)	(-9.517)						
TIER1				-0.034***	-0.035***	-0.027***			
				(-5.302)	(-5.228)	(-4.091)			
TOTCAP							-0.034***	-0.035***	-0.029***
							(-5.103)	(-5.102)	(-4.337)
PROV	0.015***	0.015***	0.015***	0.016***	0.016***	0.015***	0.015***	0.015***	0.015***
	(12.246)	(13.929)	(13.438)	(9.321)	(10.130)	(9.626)	(8.922)	(9.705)	(9.220)
INEFF	0.196*	-0.097	-0.136	-0.241*	-0.198	-0.138	-0.250*	-0.179	-0.113
	(1.896)	(-1.033)	(-1.458)	(-1.716)	(-1.565)	(-1.098)	(-1.703)	(-1.359)	(-0.867)
ROA	-0.517***	-0.544***	-0.541***	-0.822***	-0.891***	-0.896***	-0.857***	-0.939***	-0.941***
	(-4.267)	(-4.826)	(-4.827)	(-5.084)	(-6.177)	(-6.247)	(-5.000)	(-6.158)	(-6.207)
DEP	-0.022***	-0.014***	-0.006	-0.021***	-0.026***	-0.013***	-0.020***	-0.027***	-0.014***
	(-4.374)	(-4.127)	(-1.617)	(-3.351)	(-5.423)	(-2.617)	(-3.104)	(-5.546)	(-2.590)

SIZE	-0.002***	-0.001***	-0.001***	-0.001*	0.001	0.001	-0.001	0.001	0.001
	(-5.533)	(-4.818)	(-4.563)	(-1.696)	(0.677)	(1.321)	(-1.411)	(0.961)	(1.473)
LNGDPC		-0.003***	-0.001*		-0.005***	-0.002***		-0.005***	-0.003***
		(-3.977)	(-1.938)		(-5.427)	(-2.681)		(-5.930)	(-2.954)
INFL		0.483***	0.467***		0.362***	0.318***		0.362***	0.317***
		(11.485)	(11.036)		(7.890)	(7.008)		(7.630)	(6.770)
MCAP			-0.009***			-0.014***			-0.016***
			(-8.857)			(-11.123)			(-11.548)
Constant	0.186***	0.161***	0.146***	0.183***	0.375***	0.353***	0.183***	0.208***	0.185***
	(23.053)	(15.190)	(13.967)	(5.171)	(30.793)	(29.182)	(5.184)	(5.578)	(4.968)
Observations	16,776	16,776	16,776	8,998	8,998	8,998	8,754	8,754	8,754
R-squared	0.284	0.257	0.260	0.330	0.254	0.263	0.333	0.257	0.267
Country dummies	Yes	No	No	Yes	No	No	Yes	No	No
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 3. Robustness tests allowing for additional variables

This table reports cross-sectional regression results of the following model: $COE_t = \alpha_0 + \beta_1 CAPITAL_{t-1} + \beta_2 CONTROLS_{t-1} + FE + \varepsilon_t$. The dependent variable COE is a proxy for the cost of equity calculated as the average of the four implied cost of capital models described in Section 2.2. The $CAPITAL_{t-1}$ variables consist of either lagged EQUITY, or TIER1, or TOTCAP. The set of control variables ($CONTROLS_{t-1}$) consist of lagged bank-level and lagged country-level variables. FE is the set of fixed effects dummy variables at the year level. The lagged bank-level control variables are: PROV, INEFF, ROA, DEP, SIZE, RSTD, BETA, MTOV, NPL, and BTM. . The lagged country-level control variables are: LNGDPC, INF, and MCAP. The total sample consists of 16,776 observations from 62 countries between 1991 and 2017. Appendix A provides definitions and data sources for all the variables. Beneath each coefficient is the robust t-statistic. $*$, $**$, and $***$ indicate significance at the 10%, 5%, and 1% levels, respectively.

VARIABLES	(1) COE	(2) COE	(3) COE	(4) COE	(5) COE	(6) COE	(7) COE	(8) COE	(9) COE
EQUITY	-0.198***			-0.190***			-0.213***		
	(-8.432)			(-8.030)			(-8.532)		
TIER1		-0.038***			-0.039***			-0.041***	
		(-4.982)			(-4.088)			(-4.246)	
TOTCAP			-0.036***			-0.039***			-0.042***
			(-4.906)			(-3.638)			(-4.302)
PROV	0.014***	0.014***	0.014***	0.014***	0.015***	0.014***	0.014***	0.014***	0.014***
	(10.998)	(8.410)	(8.191)	(9.026)	(7.506)	(7.135)	(10.265)	(8.719)	(8.510)
INEFF	-0.116	-0.077	-0.063	-0.302***	-0.209*	-0.171	-0.084	-0.091	-0.068
	(-0.996)	(-0.501)	(-0.398)	(-2.712)	(-1.710)	(-1.357)	(-0.648)	(-0.571)	(-0.412)
ROA	-0.481***	-0.958***	-0.996***	-0.367**	-0.566***	-0.591***	-0.753***	-1.016***	-1.057***
	(-3.611)	(-6.270)	(-6.233)	(-2.254)	(-2.891)	(-2.803)	(-5.285)	(-6.376)	(-6.345)
DEP	-0.004	-0.010	-0.009	-0.016***	-0.042***	-0.043***	-0.010*	-0.012*	-0.011*
	(-0.767)	(-1.534)	(-1.403)	(-3.547)	(-9.020)	(-8.859)	(-1.958)	(-1.939)	(-1.655)
SIZE	-0.001***	0.001	0.001	-0.001	-0.001	-0.000	-0.002***	0.000	0.000
	(-3.061)	(1.387)	(1.531)	(-1.331)	(-1.612)	(-1.243)	(-4.396)	(0.077)	(0.371)
LNGDPC	-0.001*	-0.002*	-0.002**	0.002***	-0.001	-0.001	-0.003***	-0.002**	-0.003**

	(-1.729)	(-1.748)	(-2.043)	(2.593)	(-0.450)	(-0.713)	(-3.434)	(-2.303)	(-2.497)
INFL	0.473***	0.342***	0.337***	0.474***	0.130***	0.133***	0.410***	0.342***	0.339***
	(9.929)	(6.467)	(6.202)	(8.312)	(2.972)	(2.914)	(8.331)	(6.308)	(6.102)
MCAP	-0.012***	-0.018***	-0.020***	-0.008***	-0.007***	-0.009***	-0.014***	-0.018***	-0.020***
	(-8.499)	(-9.377)	(-9.686)	(-6.919)	(-6.688)	(-7.548)	(-8.499)	(-9.436)	(-9.812)
RSTD	0.024***	0.009*	0.009*						
	(6.587)	(1.833)	(1.710)						
BETA				0.002**	0.008***	0.008***			
				(1.972)	(5.065)	(5.044)			
MTOV							0.001**	-0.001	-0.001
							(2.126)	(-0.110)	(-0.099)
NPL									
BTM									
Constant	0.131***	0.226***	0.140***	0.107***	0.146***	0.139***	0.171***	0.160***	0.165***
	(11.917)	(3.996)	(8.024)	(7.946)	(5.017)	(9.303)	(15.842)	(11.143)	(10.555)
Observations	12,337	7,028	6,869	8,937	5,864	5,713	8,622	6,431	6,282
R-squared	0.279	0.273	0.276	0.296	0.308	0.315	0.288	0.273	0.276
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 3. Robustness tests allowing for additional variables (continued)

VARIABLES	(10) COE	(11) COE	(12) COE	(13) COE	(14) COE	(15) COE
EQUITY	-0.176***			-0.175***		
	(-9.042)			(-8.488)		
TIER1		-0.029***			-0.029***	
		(-4.355)			(-4.137)	
TOTCAP			-0.030***			-0.030***
			(-4.399)			(-4.345)
PROV				0.014***	0.014***	0.014***
				(12.157)	(9.005)	(8.774)
INEFF	0.022	0.105	0.106	-0.019	-0.030	-0.008
	(0.254)	(0.922)	(0.908)	(-0.177)	(-0.211)	(-0.056)
ROA	-0.863***	-1.168***	-1.199***	-0.519***	-0.976***	-1.016***
	(-7.225)	(-8.479)	(-8.279)	(-4.203)	(-6.801)	(-6.766)
DEP	-0.010**	-0.007	-0.007	-0.002	-0.008	-0.009
	(-2.406)	(-1.300)	(-1.324)	(-0.384)	(-1.466)	(-1.455)
SIZE	-0.001***	0.001***	0.001***	-0.001***	0.001*	0.001*
	(-3.615)	(2.654)	(2.752)	(-3.454)	(1.702)	(1.782)
LNGDPC	-0.001	-0.002**	-0.002***	-0.002***	-0.003***	-0.003***
	(-1.512)	(-2.428)	(-2.637)	(-2.972)	(-2.810)	(-3.096)
INFL	0.564***	0.404***	0.399***	0.471***	0.354***	0.349***
	(12.348)	(8.946)	(8.650)	(10.454)	(7.258)	(6.982)
MCAP	-0.010***	-0.013***	-0.014***	-0.010***	-0.015***	-0.016***
	(-8.272)	(-9.642)	(-9.933)	(-8.262)	(-9.850)	(-10.378)

NPL	0.003***	0.003***	0.003***			
	(10.646)	(8.429)	(8.012)			
BTM				0.001***	0.001***	0.001***
				(8.179)	(5.284)	(5.010)
Constant	0.153***	0.255***	0.378***	0.143***	0.204***	0.235***
	(13.341)	(4.842)	(32.184)	(12.739)	(3.093)	(4.181)
Observations	14,474	8,627	8,427	13,815	7,867	7,682
R-squared	0.272	0.249	0.252	0.281	0.276	0.280
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes

Table 4. Alternative measures of the cost of equity and risk premium

In Panel A of this Table, columns 1-12 repeat the same analysis as in Table 2 models 3, 6, and 9, after replacing *COE* with each of R_{CT}, R_{ES}, R_{GLS}, and R_{OJ}, that represent the implied cost of equity estimates of Claus and Thomas (2001), Easton (2004), Gebhardt et al. (2001), and Ohlson and Juettner-Nauroth (2005), respectively. Columns 16-18 replaces *COE* with the average of R_{ES} and R_{GLS} implied cost of equity. Columns 16-18 replaces *COE* with the principal component (R_{PCA}) of R_{CT}, R_{ES}, R_{GLS}, and R_{OJ}. Panel B replace COE by the risk premium (RPM) which is calculated as COE minus the 10-year U.S. Treasury bond yield. The total sample consists of 16,776 observations from 62 countries between 1991 and 2017. Appendix A provides definitions and data sources for all the variables. Beneath each coefficient is the robust *t*-statistic. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A. Alternative measures of the cost of equity

VARIABLES	(1) RCT	(2) RCT	(3) RCT	(4) RES	(5) RES	(6) RES	(7) RGLS	(8) RGLS	(9) RGLS
EQUITY	-0.269***			-0.208***			-0.102***		
	(-12.661)			(-7.444)			(-7.443)		
TOTCAP		-0.028***			-0.040***			-0.011***	
		(-3.590)			(-4.281)			(-2.646)	
TIER1			-0.027***			-0.038***			-0.013***
			(-3.468)			(-4.208)			(-3.357)
PROV	0.002*	0.001	0.001	0.027***	0.029***	0.030***	0.002***	0.002**	0.002**
	(1.801)	(1.408)	(1.129)	(16.504)	(11.133)	(11.691)	(2.796)	(1.960)	(2.034)
INEFF	-0.338***	-0.608***	-0.619***	-0.116	0.099	0.074	-0.175**	-0.305***	-0.340***
	(-2.910)	(-3.973)	(-4.140)	(-0.948)	(0.534)	(0.415)	(-1.986)	(-3.284)	(-3.829)
ROA	1.267***	0.765***	0.744***	-1.424***	-2.127***	-2.005***	-0.288***	-0.512***	-0.519***
	(12.295)	(8.698)	(8.421)	(-8.427)	(-8.518)	(-8.430)	(-4.033)	(-5.901)	(-6.334)
DEP	-0.001	-0.002	-0.003	-0.010**	-0.016**	-0.016**	-0.020***	-0.036***	-0.036***

	(-0.184)	(-0.299)	(-0.474)	(-2.028)	(-2.066)	(-2.132)	(-7.529)	(-8.617)	(-8.644)
SIZE	0.001*	0.003***	0.003***	-0.002***	-0.001	-0.001	-0.001***	-0.001	-0.001
	(1.890)	(9.026)	(8.749)	(-4.818)	(-1.259)	(-1.439)	(-6.281)	(-0.335)	(-0.489)
LGDPC	-0.002**	-0.006***	-0.006***	0.002	-0.001	-0.001	-0.001	-0.001*	-0.001
	(-2.197)	(-5.441)	(-5.633)	(1.622)	(-0.553)	(-0.240)	(-0.971)	(-1.898)	(-1.579)
INFL	0.665***	0.330***	0.342***	0.586***	0.348***	0.334***	0.356***	0.216***	0.225***
	(11.678)	(4.767)	(5.061)	(9.337)	(5.257)	(5.172)	(10.847)	(5.875)	(6.292)
MCAP	-0.009***	-0.018***	-0.015***	-0.008***	-0.014***	-0.014***	-0.011***	-0.016***	-0.015***
	(-5.884)	(-7.648)	(-6.959)	(-5.498)	(-8.138)	(-8.084)	(-12.329)	(-15.897)	(-15.471)
Constant	0.131***	0.108***	0.107***	0.124***	0.264***	0.639***	0.134***	0.037***	0.034***
	(9.355)	(5.530)	(5.514)	(7.839)	(3.416)	(34.129)	(17.114)	(4.413)	(4.157)
Observations	12,643	7,406	7,604	16,014	8,338	8,567	14,751	7,948	8,171
R-squared	0.245	0.174	0.168	0.315	0.363	0.359	0.210	0.252	0.247
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 4. Alternative measures of the cost of equity and risk premium (continued)

VARIABLES	(10) ROJN	(11) ROJN	(12) ROJN	(13) RES_GLS	(14) RES_GLS	(15) RES_GLS	(16) RPCA	(17) RPCA	(18) RPCA
EQUITY	-0.129***			-2.873***			-6.102***		
	(-7.206)			(-6.957)			(-9.359)		
TOTCAP		-0.018***			-0.483***			-0.776***	
		(-3.086)			(-3.954)			(-3.695)	
TIER1			-0.018***			-0.536***			-0.886***
			(-3.048)			(-4.471)			(-4.144)
PROV	0.014***	0.013***	0.014***	0.241***	0.249***	0.258***	0.300***	0.295***	0.300***
	(15.146)	(11.465)	(11.660)	(12.629)	(10.119)	(10.475)	(10.601)	(8.666)	(8.834)
INEFF	0.117	0.376***	0.363***	-5.221**	-5.049**	-5.918***	-3.667	1.173	-0.153
	(1.312)	(2.955)	(2.963)	(-2.512)	(-2.190)	(-2.659)	(-1.210)	(0.323)	(-0.044)
ROA	-0.624***	-0.9446***	-0.917***	-18.896***	-29.978***	-28.648***	-7.268**	-25.484***	-24.915***
	(-5.651)	(-7.673)	(-7.683)	(-8.335)	(-11.503)	(-11.342)	(-2.295)	(-8.045)	(-8.097)
DEP	-0.014***	-0.027***	-0.026***	-0.483***	-0.802***	-0.797***	-0.837***	-1.274***	-1.274***
	(-3.774)	(-4.594)	(-4.587)	(-6.095)	(-6.136)	(-6.274)	(-6.319)	(-6.378)	(-6.553)
SIZE	0.001	0.001***	0.001***	-0.030***	-0.005	-0.007	-0.016*	0.032***	0.029**
	(0.498)	(2.915)	(3.038)	(-4.987)	(-0.681)	(-0.934)	(-1.682)	(2.599)	(2.386)
LGDPC	-0.001	-0.003***	-0.003***	0.016	-0.045**	-0.040**	0.009	-0.114***	-0.112***
	(-0.857)	(-3.061)	(-2.966)	(0.825)	(-2.305)	(-2.055)	(0.282)	(-4.509)	(-4.524)
INFL	0.676***	0.376***	0.377***	13.086***	6.598***	6.508***	23.892***	12.088***	12.106***
	(12.417)	(7.407)	(7.599)	(11.597)	(6.187)	(6.215)	(12.897)	(8.767)	(8.957)
MCAP	-0.008***	-0.016***	-0.014***	-0.232***	-0.396***	-0.365***	-0.365***	-0.598***	-0.542***
	(-7.393)	(-11.257)	(-10.752)	(-9.398)	(-14.087)	(-13.774)	(-9.926)	(-14.205)	(-13.616)

Constant	0.138***	0.195***	0.216***	0.379	4.037***	1.241***	0.401	1.805***	1.716***
	(11.087)	(15.329)	(9.176)	(1.470)	(15.736)	(4.189)	(0.981)	(4.883)	(4.794)
Observations	15,287	7,900	8,127	13,998	7,536	7,745	11,500	6,686	6,866
R-squared	0.296	0.264	0.260	0.323	0.365	0.360	0.339	0.302	0.298
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 4. Alternative measures of the cost of equity and risk premium (continued)

Panel B. Risk premium

VARIABLES	(1) RPM	(2) RPM	(3) RPM
EQUITY	-0.175***		
	(-9.648)		
TIER1		-0.027***	
		(-4.106)	
TOTCAP			-0.029***
			(-4.339)
PROV	0.014***	0.015***	0.015***
	(13.415)	(9.570)	(9.161)
INEFF	-0.129	-0.148	-0.123
	(-1.393)	(-1.179)	(-0.945)
ROA	-0.560***	-0.899***	-0.945***
	(-5.068)	(-6.255)	(-6.219)
DEP	-0.006	-0.013**	-0.013**
	(-1.624)	(-2.560)	(-2.529)
SIZE	-0.001***	0.000	0.000
	(-4.546)	(1.244)	(1.394)
LGDPC	-0.001*	-0.002***	-0.003***
	(-1.951)	(-2.699)	(-2.963)
INFL	0.471***	0.324***	0.323***
	(11.068)	(7.017)	(6.786)
MCAP	-0.009***	-0.014***	-0.016***
	(-8.862)	(-11.175)	(-11.612)
Constant	0.092***	0.150***	0.155***
	(8.825)	(4.027)	(4.170)
Observations	16,724	8,978	8,735
R-squared	0.379	0.380	0.382
COMMENTS	Country and year dummies	Year dummy	Year dummy

Table 5: Endogeneity and sample composition

Panel A of this Table reports endogeneity robustness results. Columns 1-3 report the cross-sectional regressions where all variables are averaged by bank. Columns 4-6 report the Fama-MacBeath regression results. Columns 7-9 report the results of the second stage from the two-stage least square (2 SLS) regressions for the baseline models (3), (6), and (9) of Table 2 where the instrument for each of the three capital variables (*EQUITY*, *TIER1*, and *TOTCAP*) is its mean by country-year, excluding the focal bank to mitigate endogeneity. Panel B reports the results for all countries, excluding the US in Columns 1-3 and the US separately in Columns 4-6. .The total sample consists of 16,776 observations from 62 countries between 1991 and 2017. Appendix A provides definitions and data sources for all the variables. Beneath each coefficient is the robust *t*-statistic. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Endogeneity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	*COE*	*COE*	*COE*	*COE*	*COE*	*COE*	*COE*	*COE*	*COE*
EQUITY	-0.117***			-0.187***			-0.218***		
	(-2.937)			(-6.468)			(-5.420)		
TIER1		-0.033**			-0.283**			-0.014**	
		(-2.325)			(-2.129)			(-2.157)	
TOTCAP			-0.038**			-0.215**			-0.013**
			(-2.462)			(-2.417)			(-2.171)
PROV	0.017***	0.019***	0.019***	0.013***	0.041	0.044	0.015***	0.015***	0.015***
	(5.134)	(4.578)	(4.484)	(6.974)	(1.135)	(1.153)	(13.550)	(8.902)	(9.323)
INEFF	0.126	-0.088	-0.076	0.045	-2.483	-2.886	-0.160*	-0.125	-0.140
	(0.490)	(-0.275)	(-0.236)	(0.334)	(-1.067)	(-1.109)	(-1.856)	(-0.974)	(-1.137)
ROA	-1.108***	-1.167***	-1.195***	-0.544***	-0.319	-0.527***	-0.529***	-1.000***	-0.979***
	(-3.598)	(-3.260)	(-3.349)	(-3.328)	(-0.815)	(-3.551)	(-3.974)	(-5.962)	(-6.265)
DEP	-0.004	0.001	-0.001	-0.009*	0.211	0.224	-0.004	-0.011**	-0.010*
	(-0.395)	(0.085)	(-0.092)	(-1.909)	(0.871)	(0.912)	(-1.148)	(-2.219)	(-1.940)
SIZE	-0.001*	-0.001	-0.001	-0.002***	-0.004	0.002	-0.002***	-0.001*	-0.001**
	(-1.646)	(-0.318)	(-0.242)	(-3.008)	(-0.486)	(0.247)	(-4.135)	(-1.691)	(-2.311)
LGDPC	-0.003*	0.001	-0.001	-0.003*	0.025	0.044	-0.001*	-0.003***	-0.003***
	(-1.694)	(0.147)	(-0.023)	(-2.028)	(0.138)	(0.225)	(-1.811)	(-3.768)	(-3.391)
INFL	0.630***	0.632***	0.636***	0.400***	1.167	0.726*	0.473***	0.286***	0.285***
	(6.341)	(5.268)	(5.274)	(8.007)	(1.558)	(1.975)	(11.248)	(6.622)	(6.798)
MCAP	-0.002	-0.008**	-0.008**	-0.008**	-0.003	-0.001	-0.009***	-0.016***	-0.015***
	(-0.786)	(-2.225)	(-2.168)	(-2.459)	(-0.177)	(-0.085)	(-8.771)	(-11.502)	(-11.443)

Constant	0.153***	0.112***	0.119***	0.166***	-0.240	-0.467	0.103***	0.161***	0.152***
	(6.204)	(4.478)	(4.700)	(11.368)	(-0.120)	(-0.216)	(7.220)	(16.266)	(15.739)
Observations	2,195	1,519	1,501	16,776	8,998	8,754	16,776	8,998	8,754
R-squared	0.286	0.302	0.302	0.300	0.470	0.467	0.265	0.272	0.265

Table 5: Endogeneity and sample composition (continued)

Panel B: Estimations excluding banks from the US and separate estimations for the US.

VARIABLES	(1) *COE*	(2) *COE*	(3) *COE*	(4) *COE*	(5) *COE*	(6) *COE*
EQUITY	-0.190***			-0.187***		
	(-5.771)			(-9.563)		
TIER1		-0.007**			-0.046***	
		(2.175)			(-5.854)	
TOTCAP			-0.003**			-0.039***
			(-2.187)			(-5.169)
PROV	0.014***	0.012***	0.012***	0.016***	0.020***	0.020***
	(10.025)	(6.304)	(5.897)	(9.577)	(8.053)	(8.066)
INEFF	0.024	0.373*	0.395*	-0.092	-0.324**	-0.305*
	(0.164)	(1.851)	(1.784)	(-0.866)	(-1.993)	(-1.872)
ROA	-0.269	-0.735***	-0.769***	-0.936***	-0.923***	-0.922***
	(-1.639)	(-3.580)	(-3.383)	(-6.784)	(-4.900)	(-4.874)
DEP	0.002	-0.002	-0.004	-0.028***	-0.028***	-0.025***
	(0.313)	(-0.300)	(-0.589)	(-5.549)	(-2.827)	(-2.587)
SIZE	-0.002***	-0.001***	-0.001***	-0.002***	-0.002***	-0.001***
	(-3.179)	(-2.636)	(-2.864)	(-6.827)	(-3.395)	(-2.975)
LGDPC	0.001	-0.001	-0.001	-0.318*	-0.087	-0.078
	(0.463)	(-0.400)	(-1.002)	(-1.732)	(-0.403)	(-0.361)
INFL	0.459***	0.296***	0.290***	1.284**	1.336***	1.345***
	(10.664)	(6.299)	(5.946)	(2.465)	(2.980)	(2.976)
MCAP	-0.009***	-0.014***	-0.016***	-0.043	-0.009	-0.009
	(-7.955)	(-11.214)	(-11.499)	(-0.680)	(-0.113)	(-0.113)
Constant	0.112***	0.335***	0.343***	3.345*	1.037	0.943
	(8.877)	(23.613)	(23.875)	(1.822)	(0.453)	(0.410)
Observations	8,406	4,521	4,288	8,370	4,477	4,466
R-squared	0.231	0.238	0.241	0.299	0.305	0.304
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Excluding the US	Excluding the US	Excluding the US	US	US	US

Table 6. Additional tests.

In this Table, Panel A repeats the same analysis as in Table 2 models 3, 6, and 9 for below-median and above-median subsamples. Columns (1) and (2) report the results for observations, whose EQUITY ratio is below and above the country-year medians, respectively. Columns (3) and (4) report the results for observations, whose TIER1 ratio is below and above the country-year medians, respectively. Columns (5) and (6) report the results for observations, whose TOTCAP ratio is below and above the country-year medians, respectively. Panel B repeats the same analysis as in Table 2 models 3, 6, and 9 for the four quartile, where columns (1), (5), and (9) report the results for the 1st quartile and columns (4), (8), and (12) report the results for the 4th quartile for the variables EQUITY, TIER1, and TOTCAP, respectively. Panel C repeats the same analysis as in Table 2 models 3, 6, and 9 for developed and emerging markets. Panel D repeats the same analysis as in Table 2 models 3, 6, and 9 for small and large banks, where small (large) banks are banks whose *SIZE* is lower (higher) than the median *SIZE* for all banks from the same country. The total sample consists of 16,776 observations from 62 countries between 1991 and 2017. Appendix A provides definitions and data sources for all the variables. Beneath each coefficient is the robust *t*-statistic. *, **, and *** indicate significance at the 10%, 5%, and 1% levels, respectively.

VARIABLES	(1) COE	(2) COE	(3) COE	(4) COE	(5) COE	(6) COE
EQUITY	-0.291***	-0.140***				
	(-4.867)	(-6.453)				
TIER1			-0.173**	-0.009*		
			(-2.553)	(-1.782)		
TOTCAP					-0.115**	-0.012**
					(-2.192)	(-2.193)
PROV	0.015***	0.013***	0.017***	0.012***	0.019***	0.011***
	(8.793)	(9.259)	(6.119)	(7.822)	(6.301)	(8.464)
INEFF	0.072	-0.282***	-0.084	-0.098	-0.104	-0.031
	(0.446)	(-2.713)	(-0.425)	(-0.639)	(-0.476)	(-0.207)
ROA	-1.027***	-0.0599	-0.972***	-0.665***	-1.042***	-0.678***
	(-5.156)	(-0.464)	(-3.454)	(-4.876)	(-3.644)	(-4.858)
DEP	0.000	-0.008*	-0.023***	-0.014**	-0.021**	-0.016***
	(0.000)	(-1.740)	(-2.760)	(-2.154)	(-2.149)	(-2.671)
SIZE	-0.002***	-0.001*	-0.002***	0.002***	-0.001	0.002***
	(-3.738)	(-1.879)	(-2.693)	(4.148)	(-0.930)	(4.114)
LGDPC	-0.002*	-0.001	-0.002	-0.003**	-0.001	-0.004***
	(-1.797)	(-0.822)	(-1.142)	(-2.572)	(-0.872)	(-3.453)
INFL	0.556***	0.371***	0.432***	0.244***	0.413***	0.248***
	(9.411)	(6.477)	(5.756)	(4.608)	(5.409)	(4.469)
MCAP	-0.008***	-0.011***	-0.007***	-0.019***	-0.010***	-0.020***
	(-4.979)	(-7.356)	(-3.552)	(-10.754)	(-5.638)	(-10.031)

Constant	0.152***	0.137***	0.171***	0.139***	0.275***	0.385***
	(9.918)	(9.941)	(9.960)	(7.420)	(5.821)	(29.341)
Observations	8,308	8,468	4,346	4,652	4,325	4,429
R-squared	0.293	0.233	0.297	0.242	0.301	0.257
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Below median	Above median	Below median	Above median	Below median	Above median

Panel A: Split using country-year medians

Table 6. Additional tests (continued)

Panel B. Quartile regressions of bank capital on the cost of equity

VARIABLES	(1) COE	(2) COE	(3) COE	(4) COE	(5) COE	(6) COE	(7) COE	(8) COE	(9) COE	(10) COE	(11) COE	(12) COE
EQUITY	-0.789***	-0.232*	-0.245**	-0.077***								
	(-5.447)	(-1.881)	(-2.291)	(-3.193)								
TIER1					-0.151	-0.048	-0.042	-0.021***				
					(-0.977)	(-0.280)	(-0.280)	(-3.188)				
TOTCAP									-0.081	-0.389**	-0.086	-0.020***
									(-0.371)	(-2.448)	(-0.719)	(-2.872)
PROV	0.022***	0.011***	0.010***	0.011***	0.021***	0.019***	0.009***	0.009***	0.025***	0.014***	0.009***	0.009***
	(8.233)	(5.972)	(5.400)	(7.547)	(4.510)	(6.514)	(4.733)	(5.164)	(5.226)	(5.182)	(5.242)	(5.036)
INEFF	-0.419	0.138	-0.094	0.150	-0.295	-0.733***	-0.178	0.604***	0.170	-0.647***	-0.218	0.788***
	(-1.349)	(0.928)	(-0.542)	(1.088)	(-0.816)	(-2.961)	(-0.863)	(3.060)	(0.498)	(-2.907)	(-1.056)	(3.610)
ROA	-0.779**	-1.204***	-0.933***	-0.058	-0.955**	-1.354***	-0.983***	-0.254*	-0.862*	-1.578***	-0.754***	-0.468**
	(-2.110)	(-5.461)	(-4.350)	(-0.520)	(-2.026)	(-4.918)	(-4.265)	(-1.780)	(-1.882)	(-6.688)	(-4.671)	(-2.439)
DEP	0.024***	-0.003	-0.032***	-0.008	0.022*	-0.017	-0.041***	-0.032***	0.010	0.007	-0.044***	-0.035***
	(3.136)	(-0.433)	(-3.185)	(-1.176)	(1.801)	(-1.578)	(-4.207)	(-3.283)	(0.682)	(0.771)	(-5.445)	(-3.303)
SIZE	-0.003***	-0.001***	-0.001	-0.001	-0.000	-0.002***	0.000	0.003***	-0.001	0.000	0.001	0.004***
	(-4.648)	(-3.269)	(-1.206)	(-1.260)	(-0.313)	(-2.828)	(0.756)	(3.960)	(-0.887)	(0.659)	(1.133)	(5.036)
LGDPC	-0.001	-0.006***	0.000	0.002**	0.003	-0.004**	-0.001	-0.000	-0.002	-0.003	-0.002*	-0.001
	(-0.377)	(-4.184)	(0.196)	(2.016)	(1.285)	(-2.451)	(-1.050)	(-0.274)	(-0.886)	(-1.407)	(-1.913)	(-0.513)
INFL	0.404***	0.205**	0.621***	0.459***	0.319***	0.190**	0.377***	0.327***	0.200	0.393***	0.376***	0.321***
	(3.343)	(2.330)	(7.749)	(7.821)	(3.251)	(2.349)	(4.859)	(3.489)	(1.489)	(4.929)	(5.270)	(3.722)
MCAP	-0.002	-0.017***	-0.009***	-0.013***	-0.013***	-0.012***	-0.014***	-0.017***	-0.016***	-0.014***	-0.013***	-0.020***
	(-0.936)	(-10.167)	(-3.447)	(-4.484)	(-3.770)	(-4.133)	(-6.236)	(-6.044)	(-3.754)	(-4.080)	(-7.084)	(-7.685)
Constant	0.154***	0.216***	0.145***	0.051*	0.111***	0.161***	0.194***	0.124***	0.271***	0.221***	0.184***	0.095***
	(5.666)	(9.646)	(6.063)	(1.736)	(4.098)	(6.330)	(7.936)	(5.775)	(2.765)	(7.104)	(7.452)	(4.293)
Observations	4,193	4,203	4,210	4,170	2,312	2,272	2,234	2,180	2,234	2,257	2,171	2,092

R-squared	0.303	0.305	0.284	0.287	0.313	0.356	0.285	0.207	0.348	0.365	0.284	0.230
COMMENTS	Year dummy	Year dummy	Year dummy	Year dummy	Year dummy	Year dummy	Year dummy	Year dummy	Year dummy	Year dummy	Year dummy	Year dummy

Table 6. Additional tests (continued)

Panel C: Developed versus emerging countries

VARIABLES	(1) COE	(2) COE	(3) COE	(4) COE	(5) COE	(6) COE
EQUITY	-0.153***	-0.314***				
	(-9.462)	(-6.669)				
TIER1			-0.030***	-0.053**		
			(-4.859)	(-2.257)		
TOTCAP					-0.027***	-0.126**
					(-4.264)	(-2.544)
PROV	0.018***	0.010***	0.018***	0.010***	0.018***	0.010***
	(13.453)	(5.818)	(9.036)	(4.269)	(8.891)	(3.975)
INEFF	-0.109	-0.107	-0.248**	0.477	-0.239*	0.677**
	(-1.346)	(-0.492)	(-2.012)	(1.569)	(-1.863)	(2.097)
ROA	-0.828***	-0.027	-1.128***	-0.443	-1.141***	-0.446
	(-6.915)	(-0.140)	(-7.146)	(-1.572)	(-7.094)	(-1.440)
DEP	-0.015***	-0.014	-0.028***	0.004	-0.029***	0.001
	(-4.197)	(-1.277)	(-5.276)	(0.307)	(-5.247)	(0.026)
SIZE	-0.001***	-0.002*	-0.001	0.002***	-0.001	0.002**
	(-5.140)	(-1.937)	(-0.752)	(2.687)	(-0.547)	(2.104)
LGDPC	0.003	0.001	0.001	0.002	-0.001	0.002
	(1.408)	(0.953)	(0.313)	(1.341)	(-0.272)	(1.616)
INFL	0.103*	0.463***	0.167**	0.378***	0.171**	0.383***
	(1.901)	(10.594)	(2.246)	(7.196)	(2.219)	(7.018)
MCAP	0.001	-0.021***	-0.005***	-0.025***	-0.005***	-0.026***
	(0.834)	(-10.935)	(-3.157)	(-9.650)	(-3.370)	(-10.156)
Constant	0.122***	0.101***	0.150***	0.134***	0.167***	0.119***
	(5.653)	(2.884)	(3.262)	(3.096)	(3.610)	(4.517)
Observations	12,799	3,977	6,827	2,171	6,665	2,089
R-squared	0.267	0.236	0.300	0.188	0.302	0.195
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Developed	Emerging	Developed	Emerging	Developed	Emerging

Table 6. Additional tests (continued)

Panel D: Small and large banks

VARIABLES	(1) *COE*	(2) *COE*	(3) *COE*	(4) *COE*	(5) *COE*	(6) *COE*
Group1						
EQUITY	-0.129***	-0.256***				
	(-5.866)	(-7.745)				
TIER1			-0.029***	-0.024**		
			(-3.680)	(-2.025)		
TOTCAP					-0.031***	-0.026**
					(-4.030)	(-2.062)
PROV	0.015***	0.014***	0.016***	0.014***	0.015***	0.014***
	(10.198)	(8.542)	(7.893)	(6.209)	(7.734)	(5.847)
INEFF	-0.212*	-0.015	-0.139	-0.059	-0.116	-0.034
	(-1.661)	(-0.111)	(-0.675)	(-0.372)	(-0.529)	(-0.211)
ROA	-0.376***	-0.727***	-0.584***	-1.043***	-0.653***	-1.076***
	(-2.766)	(-3.947)	(-3.879)	(-4.400)	(-4.181)	(-4.241)
DEP	0.009*	-0.018***	0.022**	-0.034***	0.024***	-0.034***
	(1.685)	(-3.494)	(2.570)	(-5.552)	(2.590)	(-5.487)
SIZE	-0.001**	-0.001**	0.002**	0.001*	0.002**	0.001*
	(-2.127)	(-2.458)	(2.477)	(1.650)	(2.060)	(1.792)
Group2						
LGDPC	-0.002**	-0.001	-0.001	-0.004***	-0.001	-0.004***
	(-2.111)	(-1.222)	(-0.367)	(-3.504)	(-0.491)	(-3.767)
INFL	0.489***	0.422***	0.367***	0.288***	0.351***	0.287***
	(8.644)	(7.263)	(4.803)	(5.223)	(4.496)	(4.935)
MCAP	-0.007***	-0.011***	-0.014***	-0.013***	-0.019***	-0.013***
	(-4.239)	(-8.379)	(-5.045)	(-8.962)	(-6.198)	(-8.771)
Constant	0.132***	0.164***	0.165**	0.371***	0.081***	0.174***
	(9.031)	(11.251)	(2.384)	(25.033)	(3.826)	(8.808)
Observations	8,469	8,307	3,587	5,411	3,457	5,297
R-squared	0.242	0.309	0.233	0.307	0.240	0.308
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes
Sample	Small banks	Large banks	Small banks	Large banks	Small banks	Large banks

Appendix A: Variables, definitions, and sources

Variable	Definition	Source
Panel A. Implied Cost of Equity		
R_{CT}	Implied cost of equity estimated using the Claus and Thomas (2001) model.	Authors' calculation based on I/B/E/S and DataStream.
R_{GLS}	Implied cost of equity estimated using the Gebhardt et al. (2001) model.	As above
R_{OJ}	Implied cost of equity estimated using the Ohlson and Juttner-Nauroth (2005) model.	As above
R_{ES}	Implied cost of equity estimated using the Easton (2004) model.	As above
COE	Equally weighted average of R_{ES}, R_{OJ}, R_{CT}, and R_{GLS}	As above
R_{ES_GLS}	Equally weighted average of R_{ES} and R_{GLS}	As above
R_{PCA}	Principal component of R_{ES}, R_{OJ}, R_{CT}, and R_{GLS}	As above
RPM	Risk premium, which is equal to cost of equity measured by COE minus the 10-year U.S. Treasury bond yield.	As above
Panel B. Capital ratio variables		
EQUITY	The lagged equity-to-assets ratio.	Authors' calculation based on Bloomberg, DataStream, and Reuters.
TIER1	The lagged (Tier 1 /Risk weighted assets) ratio.	As above
TOTCAP	The lagged ((Tier 1+Tier 2)/Risk weighted assets) ratio.	As above
Panel C. Bank-level control variables		
PROV	The lagged loan loss provision to total loans ratio.	Authors' calculation based on Bloomberg, DataStream, and Reuters.
INEFF	The lagged (Salaries and benefits/total assets) ratio.	As above
ROA	The lagged return on assets ratio.	As above
DEP	The lagged (Total deposits/Total assets) ratio.	As above
SIZE	The lagged natural logarithm of the bank's total assets in US dollar	As above
RSTD	The lagged standard deviation of daily returns over one-ear period	As above
BETA	The lagged beta estimated as the covariance between the firm returns and the market return relative to the variance of the market returns.	As above
MTOV	The lagged one-year turnover volume.	As above
NPL	The lagged non-performing loans to total loans ratio	As above
BTM	The book-to-market ratio.	As above
Panel D. Country-level control variables		
LNGDP	The lagged logarithm of GDP per capita.	International Financial Statistics and World Development Indicators
INFL	The lagged inflation measured as the annualised yearly median of a country-specific one-year-ahead realised monthly inflation rate.	As above
MCAP	The lagged (Total stock market capitalisation/GDP) ratio at the country level.	As above

Appendix B: Cost of equity models

1. Claus and Thomas (2001) model

This model assumes clean surplus accounting, allowing the current share price to be expressed in terms of the cost of equity, current book value, forecasted abnormal earnings, and perpetual abnormal earnings growth. Forecasted abnormal earnings (*ae*) is given by forecasted earnings minus a charge for the cost of equity. The explicit forecast horizon is set at five years, beyond which forecasted residual earnings grow at the expected inflation rate. The valuation equation is given by

$$P_t = B_t + \sum_{\tau=1}^{5} \frac{ae_{t+\tau}}{(1+r_{CT})^{\tau}} + \frac{ae_{t+5}(1+i_t)}{(r_{CT}-i_t)(1+r_{CT})^5}, \quad \text{(B.1)}$$

where P_t represents stock price at time t, and i_t is defined as the long-term abnormal earnings growth rate, calculated by using the annualised yearly median of a country-specific one-year-ahead realised monthly inflation rate. B_t is the current book value per share (at the beginning of year *t*), $ae_{t+\tau} = FEPS_{t+\tau} - r_{CT}$. $B_{t+\tau-1}$, $B_{t+\tau}$ is the forecasted book value per share for year $t + \tau$—measured using the clean surplus relationship (i.e., $B_{t+\tau-1} + FEPS_{t+\tau}(1 - r_{t+\tau})$)—and r_{CT} is the cost of equity capital. Eq. (B.1) is solved *numerically* for r_{CT}.

2. Gebhardt et al. (2001) model

This model also assumes clean surplus accounting, where the share price is expressed in terms of the cost of equity, the current book value, and forecasted ROE and book value. The explicit forecast horizon is set at three years, beyond which forecasted ROE decays to a target ROE by the twelfth year and remains constant afterwards. The model equation is given by

$$P_t = B_t + \sum_{\tau=1}^{11} \frac{FROE_{t+\tau} - r_{GLS}}{(1+r_{GLS})^{\tau}} B_{t+\tau-1} + \frac{FROE_{t+12} - r_{GLS}}{r_{GLS}(1+r_{GLS})^{11}} B_{t+11}, \quad \text{(B.2)}$$

where P_t and B_t are refined, as in the previous models; $FROE_{t+\tau}$ is the forecasted ROE for year $t+\tau$; and r_{GLS} is the cost of equity capital. Eq. (B.2) is solved numerically for r_{GLS}.

3. Ohlson and Juettner-Nauroth (2005) model

This model is an extension of the Gordon constant growth model. It allows share price to be expressed in terms of the cost of equity, the one-year-ahead earnings forecast, and the near-term and perpetual growth forecasts. The explicit forecast horizon is set at one year, after which forecast earnings grow at near-term rates, which decay into a perpetual rate. Near-term earnings growth is the average of i) the growth rates of forecasted earnings per share (FEPS) from year t + 1 to year t + 2, and ii) the

I/B/E/S long-term growth forecast (LTG). The perpetual growth rate is the expected inflation rate. The valuation equation is given by

$$P_t = \frac{FEPS_{t+1}(g_t - i_t + r_{OJN}.d_{t+1})}{r_{OJN}(r_{OJN} - i_t)}, \quad \text{(B.3)}$$

where P_t is the stock price recorded 10 months after the fiscal year-end; $FEPS_{t+\tau}$ represents the forecasted earnings for year $t+\tau$, $g_t = 0.5\left(\frac{FEPS_{t+2}}{FEPS_{t+1}} - 1 + LTG_t\right)$; d_t is the expected dividend payout at time t, estimated using the average dividend payout over the last three years, ; i_t is the forecasted earnings growth at time 3, measured as the realised inflation in year $t+1$; and r_{OJN} is the cost of equity capital. Eq. (B.3) is solved *analytically* (i.e., the solution is a closed-form expression) for r_{CT}. The model requires that $FEPS_{t+2} > 0$ and $FEPS_{t+1} > 0$ to yield a positive root.

4. Easton (2004) model

This model is a generalisation of the Price-Earnings-Growth (PEG) model. It expresses current share price in terms of the cost of equity, the expected dividend payout, and one- and two-year-ahead earnings forecasts. The explicit forecast horizon is set at two years, after which forecasted abnormal earnings grow in perpetuity at a constant rate. The expression of Easton's (2004) valuation model is given by

$$P_t = \frac{FEPS_{t+2} - FEPS_{t+1}(1 - r_{Easton}.d_{t+1})}{{r_{Easton}}^2}, \quad \text{(B.4)}$$

where P_t, $FEPS_{t+\tau}$ and d_t are defined as they were in the previous model. Knowing all the parameters, Eq. (B.4) is solved numerically for r_{Easton}. The model requires that $FEPS_{t+2} > 0$ and $FEPS_{t+1} > 0$ to yield a positive root.

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EMNES acknowledges the financial assistance of the European Union within the context of the EU project "Support to economic research, studies and dialogue of the Euro-Mediterranean Partnership" under contract number ENPI/2014/354-488 (2014-2019).

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